October 15, 1945

STEEL

The Magazine of Metalworking and Metalproducing

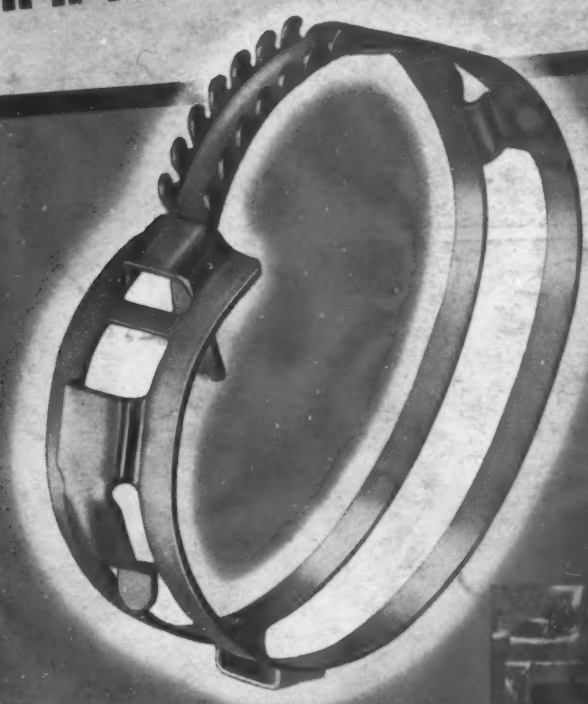
ESTABLISHED 1882

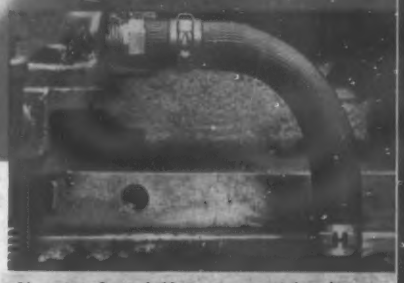
TECHNOLOGY DEPT.

ENGINEERING LIBRARY
OCT 15 1945
DETROIT

Man... WHAT A HOSE CLAMP!

ST, LATCH WITH
UMB AND FINGER





Showing Speed Clamps on quick-release air hose coupling.

SPEED CLAMP* ADVANTAGES

1. All one piece—no bolts, gears or thumb screws.
2. Exclusive, self-locking ratchet type design.
3. Faster and easier to install or remove.
4. Uniform pressure assures a leak-proof grip.
5. Exceptionally low profile—very light in weight.
6. Made of spring steel, accurately heat-treated, for more strength and longer life.
7. May be used over and over again.

TINNERMAN PRODUCTS, INC.
2039 Fulton Road • Cleveland 13, Ohio

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario.
In England: Simmonds Aerocessories, Ltd., London.
In France: Aerocessoires Simmonds, S.A., Paris.
In Australia: Simmonds Aerocessories, Pty. Ltd., Melbourne.

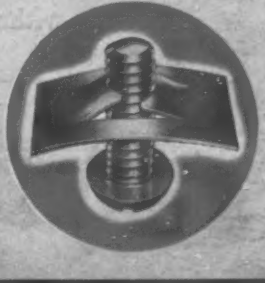
Typical application on automatic or manually operated water valves.

★ *In writing for samples, please give outside diameter of hose with fitting inserted.*

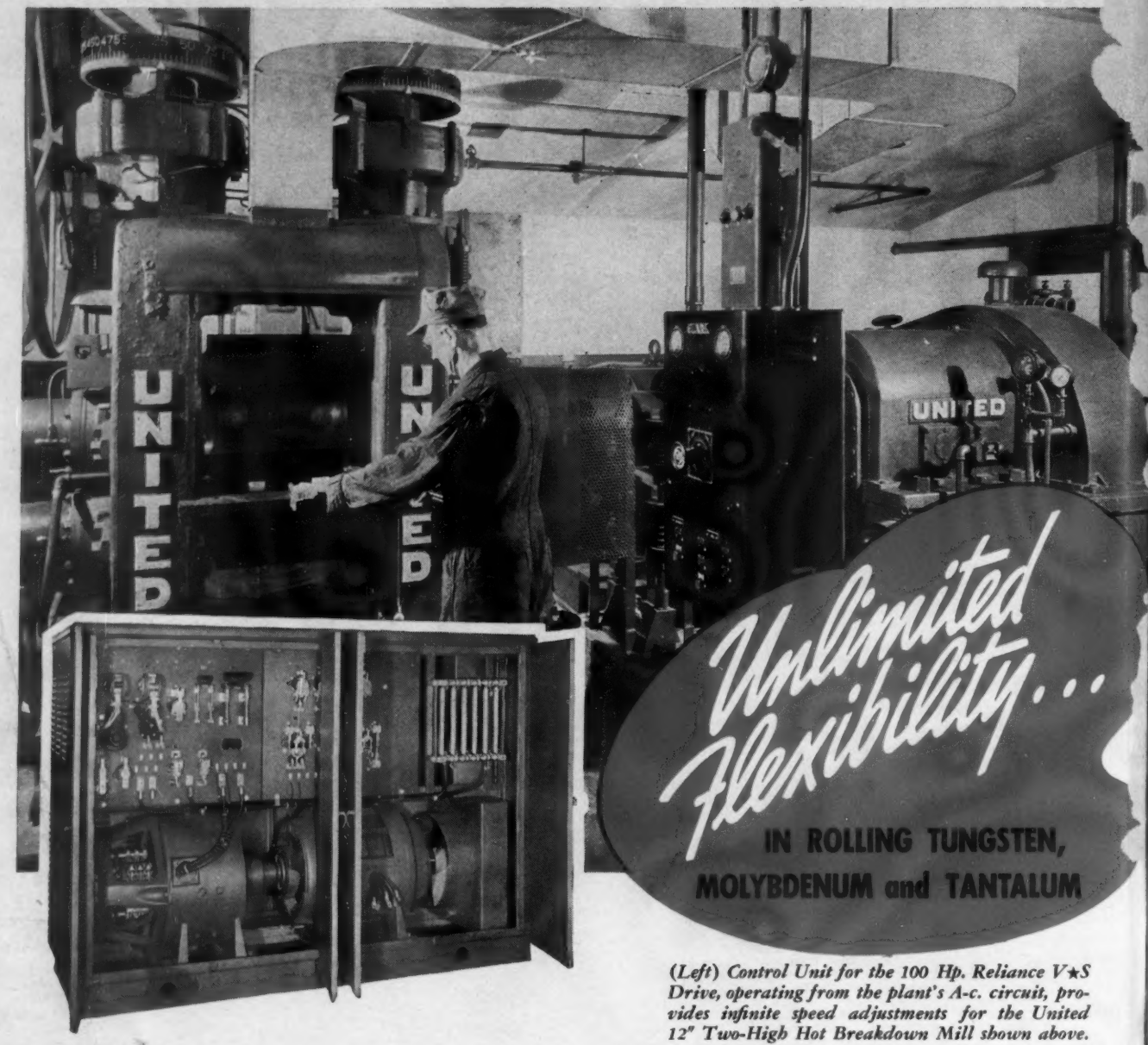
*Trade Mark

Speed Nuts*
PATENTED
*Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS



Speed Clamps are engineered and produced by the manufacturers of SPEED NUTS.



Unlimited Flexibility...

IN ROLLING TUNGSTEN, MOLYBDENUM and TANTALUM

(Left) Control Unit for the 100 Hp. Reliance V★S Drive, operating from the plant's A-c. circuit, provides infinite speed adjustments for the United 12" Two-High Hot Breakdown Mill shown above.

There was an important reason for the choice of Reliance V★S Drive to operate the specially designed hot breakdown mill in the North Chicago, Illinois, plant of the Fansteel Metallurgical Corporation. This was because, with V★S control, unlimited flexibility of operation is available for widely varied working requirements.

The mill can be adjusted easily and quickly for any desired process and speed can be changed at will to suit the material and the requirements of the job.

Whenever such flexibility is desirable, it can be obtained—without clutches or gears—by the use of V★S Drive. V★S is an *all-electric adjustable-speed drive, operating from A-c. circuits.* Starting, stopping and speed changes are controlled from nearby or remote stations. Automatic reversal is available at any desired point.

For information on how Reliance V★S Drive may help you to speed production and cut costs, call the nearest Reliance office or write for Bulletin 311.

RELIANCE ELECTRIC & ENGINEERING CO.
1081 IVANHOE ROAD • CLEVELAND 10, OHIO

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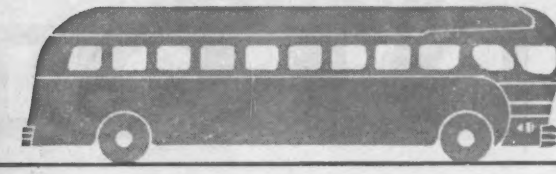
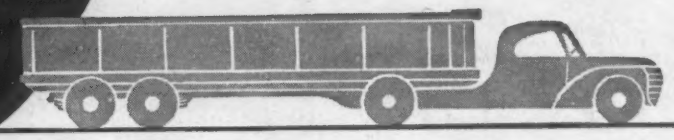
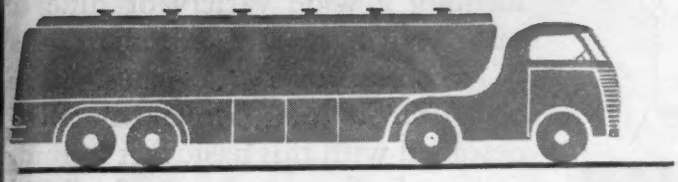
"MOTOR-DRIVE IS MORE THAN POWER"

RELIANCE A-C D-C MOTORS

Going Places WITH Mayari R



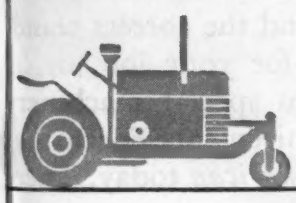




Automotive equipment designed and built with Mayari R, Bethlehem's high strength, low-alloy steel, is going places after the war. Here are some reasons why:

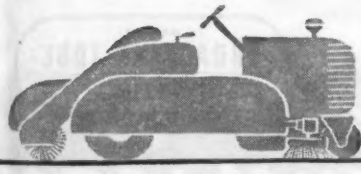
DEAD WEIGHT REDUCED AS MUCH AS 40%

One of Mayari R's important properties is its high yield point—almost twice that of mild carbon steel. Hence it affords the necessary strength, with lighter sections. This feature alone makes Mayari R worth thinking about. The weight saving—up to 40 per cent—that is made possible helps compensate for Mayari R's increased cost. Superior workability, easy weldability and feasibility of using it "as-rolled," without heat-treatment—these make the finished job comparable in cost with mild carbon steel.

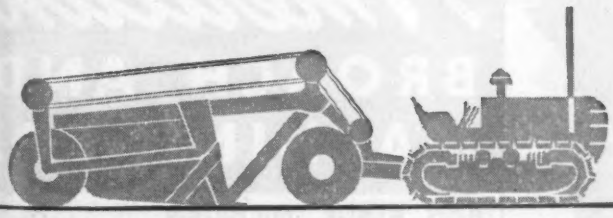


CORROSION RESISTANCE INCREASED

Mayari R's resistance to atmospheric corrosion is two to four times that of copper-bearing steel, five to six times that of mild carbon steel. In addition, Mayari R possesses great resistance to abrasion, and to impact, even at sub-zero temperatures. Tests indicate Mayari R's superior ability to hold paint. What this all adds up to, of course, is lower depreciation and maintenance charges—substantial long-term economies.



Send for illustrated catalog that will tell you more about Mayari R. Address the nearest Bethlehem district office, or Bethlehem Steel Company, Bethlehem, Pa.

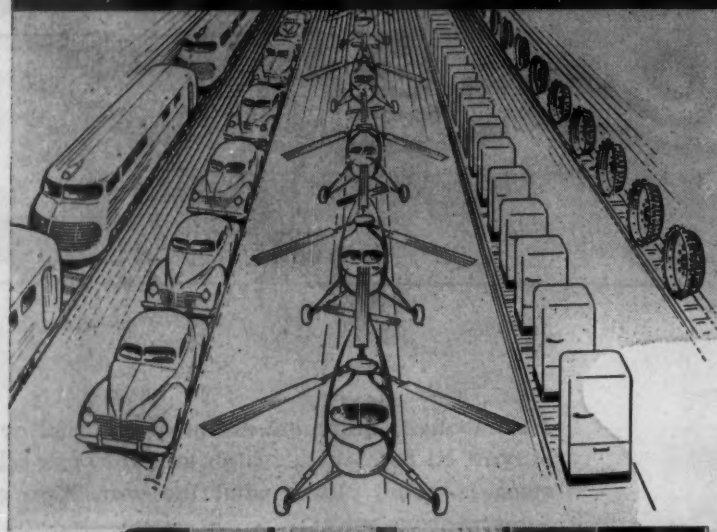


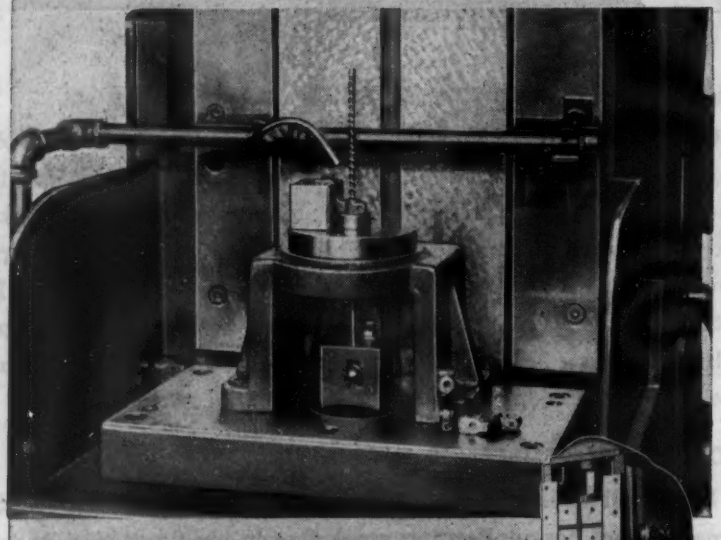
BETHLEHEM STEEL

Mayari R *makes it lighter... stronger... longer lasting*

MAKE RECONVERSION EASIER

with Broaching by ★ American





A typical set-up of the *American* T-6-24 three way broaching machine is illustrated above. For broaching small serrated holes in carburetor parts a small bridge type fixture is used. A block on top of the bridge locates the part, while the broach is held in location by a pin type broach puller. Production is fast and accurate with fine finish.

Standard equipment, capable of performing a wide variety of different tasks, can naturally eliminate many of reconversion's headaches. Standard *American* broaching machines designed with this basic fact in mind are made for maximum flexibility. That is why manufacturers in many industries turn to broaching by *American* to perform their metal finishing jobs.

American offers a complete broaching service—machines, tools, and engineering. *American* engineers will gladly recommend the correct standard equipment for your job, or, if necessary, design special machinery to meet your requirements. For further details, write *American* today. There is no obligation.

Avoid excess load on broaching tools. Do not attempt to broach parts that are improperly prepared.

MEMBER BROACHING TOOL INSTITUTE

★ American BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

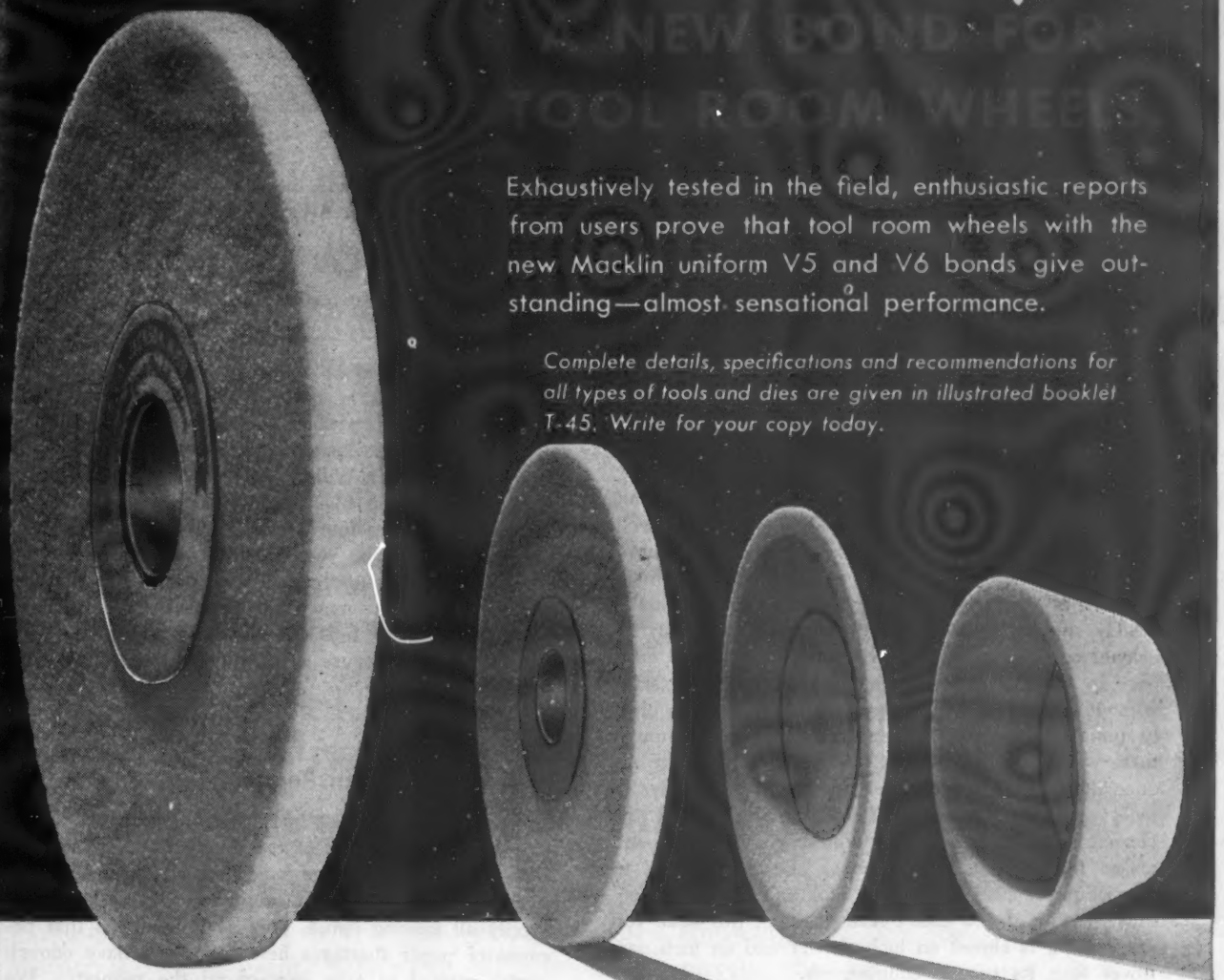
DIVISION OF SUNDSTRAND MACHINE TOOL CO.

Announcing!

A NEW BOND FOR TOOL ROOM WHEELS

Exhaustively tested in the field, enthusiastic reports from users prove that tool room wheels with the new Macklin uniform V5 and V6 bonds give outstanding—almost sensational performance.

Complete details, specifications and recommendations for all types of tools and dies are given in illustrated booklet T-45. Write for your copy today.



MACKLIN

MACKLIN COMPANY
***Manufacturers of* GRINDING WHEELS**
JACKSON, MICHIGAN, U. S. A.
Distributors in all principal cities

***Sales Offices:* Chicago • New York • Detroit • Pittsburgh**
Cleveland • Cincinnati • Milwaukee • Philadelphia

BEHIND THE SCENES

Call of the North

■ This one we'll have to throw out without verification. It may be true, but we're skeptics. Right in our own print shop the other day we picked up an amazing fact. One of the gentlemen who should know, being a solid citizen in printing circles, told us with a straight face that they always try to line a press up so it faces north and south. The reason is that on some kinds of paper, there is a tremendous amount of static electricity generated during the printing process, which in effect makes the strip of paper act like a giant compass needle and tend to point north. The pull from the north is so strong, in fact, that if the press heads east and west it will pull the paper right off the edge of the rolls and get it all messed up. Honest, we aren't kidding. That's what the man said, he said it, that's what he said!

Bigger & Better, Like Before

■ We probably won't have any of that trouble around here after the first of the year. We know you as well as us will be happy to hear that the day of transparent paper has gone for good, or at least until the next war. After the first of the year we're going to print the weekly stint on heavier paper, and it will also have a heavier coating on it. You will then have to read each page by itself, instead of being able to read both sides without turning the page. Seriously, though, we're pretty proud of the job the printers have done through these war times with STEEL. We've been forced to reduce the quality of the paper several times in order to meet the limitation orders from Washington, but the current stock—which is the lightest grade of all—still makes for a good looking book. Besides moving to heavier paper after Jan. 1, the book will be bigger, too. Maybe some of you didn't realize it, but this issue you are reading is almost an inch shorter and an inch narrower than its prewar counterparts.

The War Is Over

■ Special notice to all our loyal legion—don't try to catch us on Saturday from now on because this print shop has come back from the wars. Down from a 44-hour week to our prewar levels, we now thumb our nose at the alarm with regularity on a Saturday morning. Last week was the first, and we're beginning to suspect treachery, on account of we found more small chores around the house on Saturday morning than we ever managed to locate in the shop. In fact, there is already a growing list of Saturday morning business including such little items as storm windows, linoleum repair, bulb transplanting and shrub planting. It might have been easier to hang around on Saturday morning and beat out these literary gems.

Atoms, Past & Present

■ On reading over Art Allen's excellent piece on the "Facts About Atomic Energy" in our October 1 issue, we were reminded of a piece published some years back in our engineering section, which came from a Westinghouse publicity release. It was in November, 1940, and we ran a photo and caption about how atomic power had been used to turn on a radio transmitter. The copy must have sounded strange to our ears at that time, but now we can wade through such items as U-235 and "slow neutrons" with a contempt born of familiarity. Little did we know, etc. Before getting off this subject, however, we recommend that all who missed it should go back and pick up Art's story, on page 112 of the October 1 issue.

Numbers Dept.

■ We don't like to be upsetting our good friends, so to set your minds at rest, here's the answer to that second coin problem about how to discover one slug in 200 coins. First correct answer came in via Western Union from Jasper Willsea, Willsea Works, Rochester, N. Y. The code is 67-22-7-3-1, which means you separate the 200 coins into 3 piles of 67, 67, and 66. By balancing two piles, you discover which contains the slug. The process is repeated until the slug is isolated, which takes a maximum of five moves. We will not, however, pay any bills for the time you folks spent working it out, because it is really so simple after you have the know-how.

Note to European Readers

■ The end of hostilities in Europe has brought a batch of problems to us; one of the toughest is the fact that most countries over there have had no copies of STEEL since 1940. Many of our subscribers have asked us to supply all missing issues, but the difficulty is that because of paper shortages here we didn't have enough copies printed to take care of all the requests. We started back in 1940 to save copies for our subscribers over there, but we soon enough realized that the war was on for sure and the accumulation would push us out of house and home inside of a year. The best solution we have been able to see is to supply copies to a central point in each country, where they can be used for reference. We understand that in the occupied countries, the Germans either confiscated or destroyed most of the back issues they were able to lay their hands on, which, of course, we couldn't begin to replace.

Words & Numbers

■ We had a couple of transplanted headlines in this column two weeks ago. The other day we discovered the reason was that the printers didn't know that the word "numismatic" had to do with money. They thought it had something to do with numbers, so they put it on that house numbers item, and the other head loudly proclaimed that you can buy money in the dime store!

SHRDLU

Vol. 117, No. 16, October 15, 1945, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 77

An Important Statement of Policy

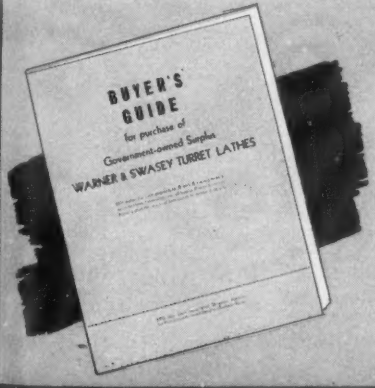
FOR years, Warner & Swasey has taken the position that its responsibility does not end with the delivery of a Warner & Swasey machine. We will continue this policy throughout this period when many government-owned surplus Warner & Swasey Turret Lathes are passing through many hands.

Besides the obligation we owe a Warner & Swasey owner, wherever he may be, we also have a deep interest in a sound, efficient, postwar national economy. It is our belief that low-cost high-production is vital to such an economy—and that means using the most efficient methods and tools available.

Warner & Swasey Maintains Records of Every Warner & Swasey Machine in Service

Given model and serial number, your nearest Warner & Swasey Branch Office can tell you *when* the machine went into service, *what special specifications* were involved—*what original equipment,* accessories and tools were included.

They can aid you further by giving you a report. Knowing the jobs you expect to use these turret lathes on will enable them to advise you whether the machine will serve you capably, or whether it would handicap your future production when compared to other possibilities for doing your job better.



SEND FOR FREE COPY

The "Buyers Guide" will prove a valuable aid in helping you determine the proper Warner & Swasey Turret Lathe to suit your needs in the purchase of surplus turret lathes. To get a copy, just write to us here in Cleveland or contact your nearest Warner & Swasey Branch Office.

You can Machine it Better, Faster, for Less... with a Warner & Swasey

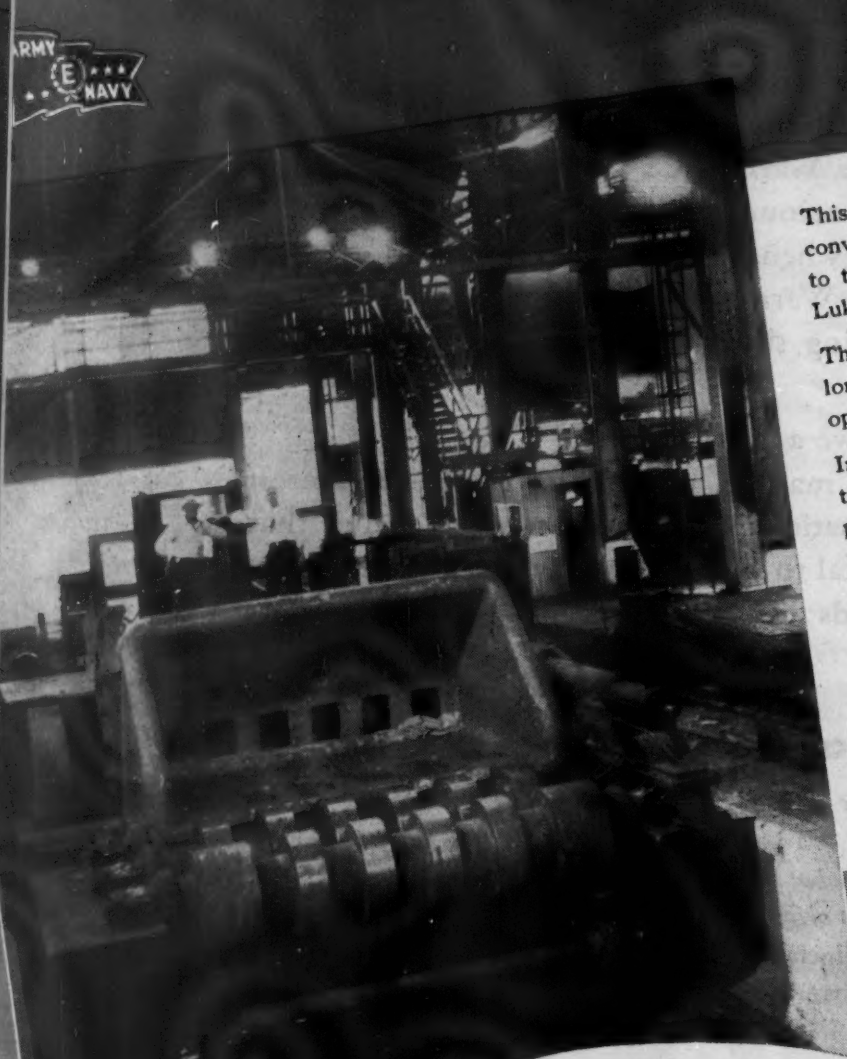
WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES, SADDLE AND RAM TYPES—CHUCKING AND BAR TOOLS—PRECISION TAPPING AND THREADING MACHINES

WORLD'S LARGEST

ingot chariot

BUILT BY ALLIANCE...



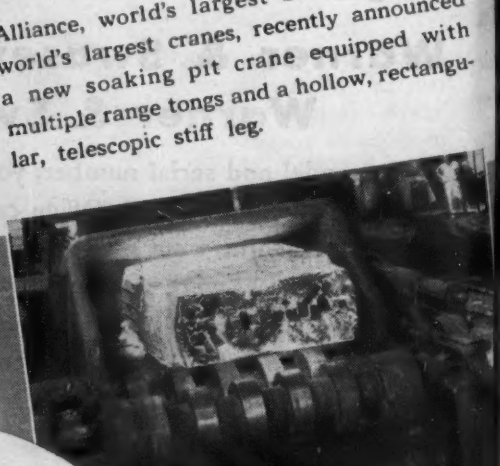
The new Alliance Ingot Chariot in dumped position.

This Alliance Ingot Chariot is designed to convey 60 ton ingots from the soaking pits to the world's largest plate mill located at Lukens Steel Company, Coatesville, Penna.

The chariot, equipped with motor-drive longitudinal motion, is designed for fast operation with finger-tip control.

Individual motors drive the rolls and additional motors furnish power for the tilting pot. The motor-driven 6-finger pusher facilitates the pushing of short ingots on to the rolls, through the six square holes in the bottom of the tilting pot.

Alliance, world's largest builders of the world's largest cranes, recently announced a new soaking pit crane equipped with multiple range tongs and a hollow, rectangular, telescopic stiff leg.



A slab ingot ready for the approach table.

Check with

Alliance

on new cranes or reconverting old cranes to give your plants more lifting power.

THE ALLIANCE MACHINE COMPANY · ALLIANCE, OHIO

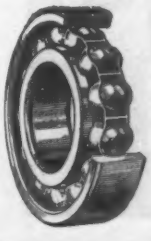
PITTSBURGH OFFICE 1622 OLIVER BUILDING

BUT **Hiroshima, where millions of ball bearings were stock-piled, was target for the first atomic bomb in history.**

AND **Schweinfurt and the other Nazi ball bearing centers were primary objectives of our bombers in Europe.**

Yes, the heart of *any* nation's industrial might is the ball bearing.

Nothing rolls like a ball. It is nature's favorite, strongest form. Thus, the *ball* bearing is a "natural" for the higher speeds, heavier loads and greater rigidity demanded by today's exacting production standards.



When designing your new machines, take advantage of the creative engineering, technical skill, long experience and precision manufacturing methods of New Departure—the world's greatest maker of ball bearings.

NEW DEPARTURE
BALL BEARINGS

3395

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN • Branches in DETROIT • CHICAGO • LOS ANGELES and other Principal Cities

New Model Way t

Power distribution problems are worked out quickly and accurately when you use Allis-Chalmers "Unit Sub Builder" Set to help with reconversion, expansion, plant modernization planning. Accurate scale models make it possible for you to *see* available equipment, *see* the various ways it can go together, *see* how the *right* unit substation will look in your plant.

1 YOU SEE WHAT'S AVAILABLE. Allis-Chalmers "Unit Sub Builder" Set contains accurate scale models of all A-C substation equipment. Visual planning is simple, practical, fast. You build the answers to your unit sub problems right on the top of your desk . . . without bogging down in charts, tables.

4 SLIDE RULE — designed to calculate secondary short circuit current — helps planner determine proper low voltage breakers. After checking load, he determines how many feeder breakers are needed. Here, low voltage unit is being built: first, bus transition, then, three 50,000 amp air circuit breakers.

5 COMPLETED MODEL unit substation is easily checked for final space requirements. By sketching a section of his plant on cross-section paper to the same scale as models — ½ in. to 1 ft, planner determines quickly and exactly how much space the unit substation will occupy. All guesswork is gone.

y to Buy Unit Subs

2 HANDY "CHECK LIST" BOOK gives you the added safety of a double check. It helps in the selection of the proper transformer, high and low voltage systems, other considerations when planning a load center unit substation. Weights and dimensions of transformers and switchgear are given.

3 PROPER SELECTION of high voltage switchgear is important. Models show at a glance the large variety of equipment available. Here, unit sub planner selects vertical lift switchgear to get protection and flexibility. He uses drop collar throat to simplify connection to 1,000 kva dry-type transformer.

6 DECISIONS ARE MADE quickly and easily when Allis-Chalmers "Unit Sub Builder" Set is used to show various arrangements that will fulfill the power distribution needs of your plant. It's a simple matter for other men in your organization to visualize how the *right* unit sub will look when installed.

Work out your Unit Sub ideas with ALLIS-CHALMERS "Unit Sub Builder" Set

To see how the "Unit Sub Builder" Set can help in your unit substation planning, call your A-C district office for a showing. There's no obligation, of course. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A 1829

SO...NOW WE'RE BACK WHERE ARITHMETIC REALLY COUNTS..

This is pre-war stuff.

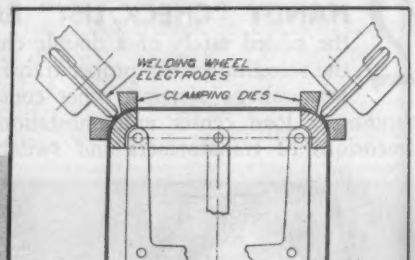
We cite it because it bears directly on the kind of goods you will make from now on, for Joe Civilian . . . remember him?

Production cost savings which must be made to maintain that better-than-pre-war standard of living necessary to your expanded facilities CAN be made in metal working industries by the application of Federal Resistance Welding.

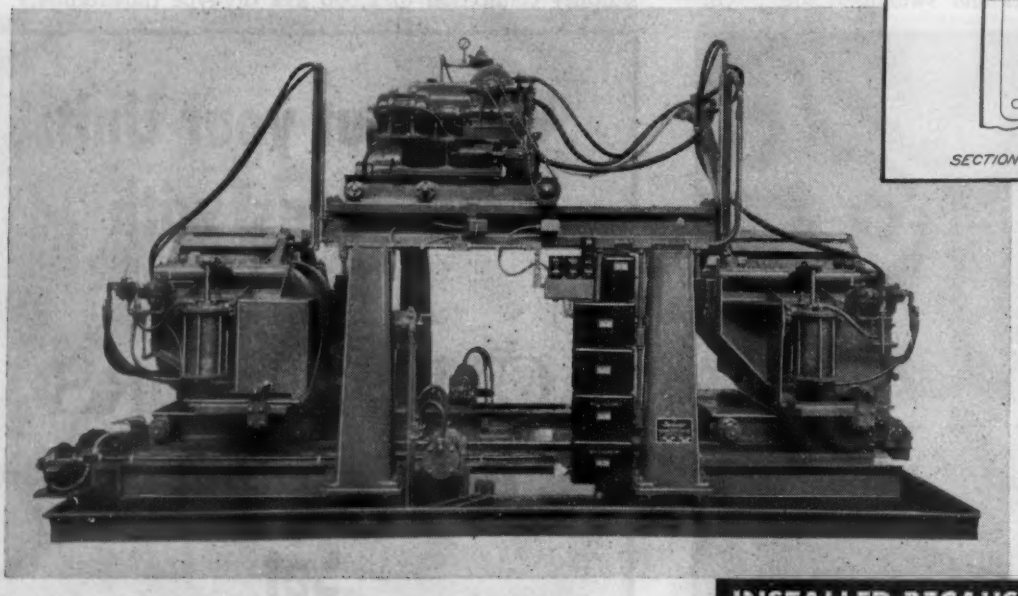
The cost arithmetic shown is from the records of one of the country's leading manufacturers. Three Federal Seam Welders of the type shown on the next page were installed in their plant. Their use resulted in annual savings of $18,000 in costs. A report of 2½ years operation showed the welders had paid for themselves and returned $24,000 profit.

Except for the fact that it is comparatively a modest example, this is typical of direct savings achieved when a product and Federal Resistance Welding are brought together by careful engineering and design. Such records are not limited to any one type of metal working industry. Successful applications cover everything from small parts assembly or joining stainless steel blades to mild steel handles for tools or cutlery, clear through all branches of sheet metal fabrications (including refrigerator liners, casings, grilles and parts) to heavy flash welding of steel ring gear blanks ten or more feet in diameter, with solid cross-sections of eighteen inches.

To find out how Federal Resistance Welding can affect the arithmetic of your particular production problem, send your specifications for applications analysis



SECTION THROUGH FIXTURE & WORK



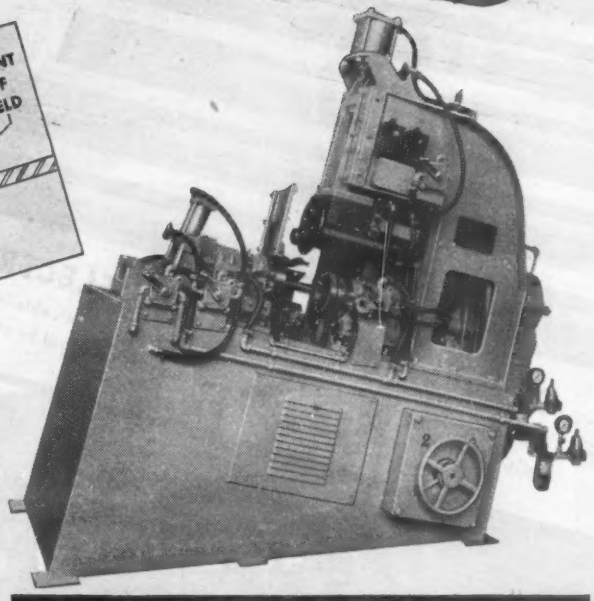
THIS FEDERAL RESISTANCE SEAM WELDER

Seam welds multiple, leak-tight joints like this.

INSTALLED BECAUSE IT CUTS COSTS

The Federal MACHINE AND WELDER CO

THIS KIND OF



THIS FEDERAL RESISTANCE SEAM WELDER

Seam welds refrigerator casings like this.

INSTALLED BECAUSE IT CUTS COSTS

THESE FEDERAL RESISTANCE WELDERS

All standard models, attain high production in assembling small parts components.

INSTALLED BECAUSE THEY CUT COSTS

MEMBER RESISTANCE WELDER MANUFACTURERS' ASSOCIATION RWMA

202 DANA ST., WARREN, O.

VERSATILE MODERN PRODUCTION TOOLS

NEW HYDRAULIC WELDERS

Two new models of spot and projection welders, hydraulically operated, are described for the first time in detail in Bulletin 4520 issued by The Federal Machine and Welder Company. One type, available in three sizes with 30, 50, or 75 KVA transformers, employs an inverted hydraulic cylinder in which the piston rod is the fixed member mounted on a unique adjustable connection which provides for close timing and quick follow up. A larger model, available in two sizes of 100 and 150 KVA also is described. Complete specifications are listed.

HOUSEWARE PRODUCTION

Anticipated expansion of houseware production points up the advantages of Federal resistance welding for the fast, low cost application of handles to enameling steel or aluminum pots and pans. Press type welders are used, with dies that permit rapid loading, give production of 500 to 800 handles per hour, depending upon type of handle applied. Cost with one manufacturer is one-fifth previous method.

HOW TO MAKE PROJECTIONS

Interesting and useful information on machines and methods for projection resistance welding is included in a new sixteen page booklet just released by The Federal Machine and Welder Company. There are descriptions of various types of projections, tables of proper measurements for projections and complete data on twenty varieties of welders adaptable for either projection of spot welding.

Several interesting special applications are illustrated. These include an eight-station dial-feed fixture for automatic welding of radar tube assemblies at high speed; a dual head for series projection welding; a special fixture for welding aircraft heat exchangers; several air clamping fixtures for quick loading and unloading of work in welding dies; a machine that automatically welds nails to trim moulding.

Special equipment such as rubber heads, air-lock heads and anti-friction slides also are shown. The book is available on request . . . Bulletin 4520.

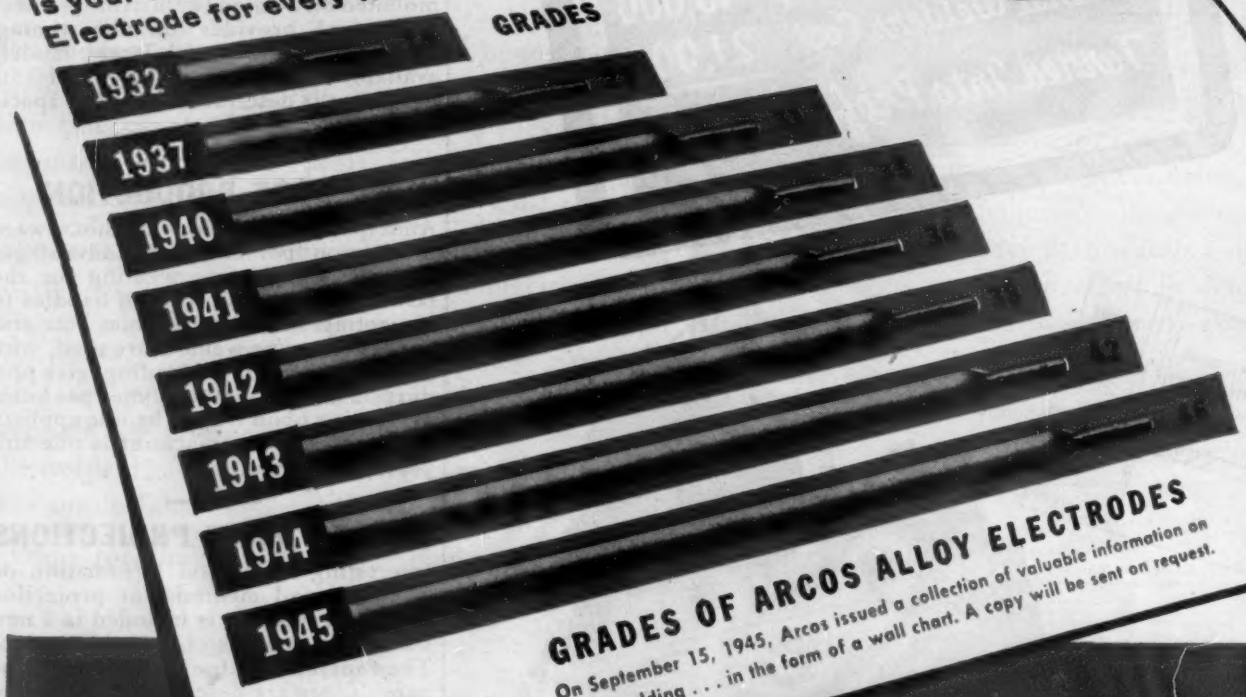
FOR CONTAINER MAKERS

A special book of particular interest to container manufacturers is in the list of literature available on request at The Federal Machine and Welder Company. Principal theme is description of a complete steel barrel welding plant. Several special machines for resistance welding a variety of metal containers are illustrated. Bulletin SP 245.

OVER the YEARS...

ARCOS has NEVER made anything but ALLOY ELECTRODES

This record of continuing specialization is your assurance of the proper ARCOS Electrode for every weldable alloy.



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On September 15, 1945, Arcos issued a collection of valuable information on alloy welding . . . in the form of a wall chart. A copy will be sent on request.

Right Now . . .

46 different grades of Arcos alloy Electrodes are available . . . Be Sure . . . Buy ARCOS

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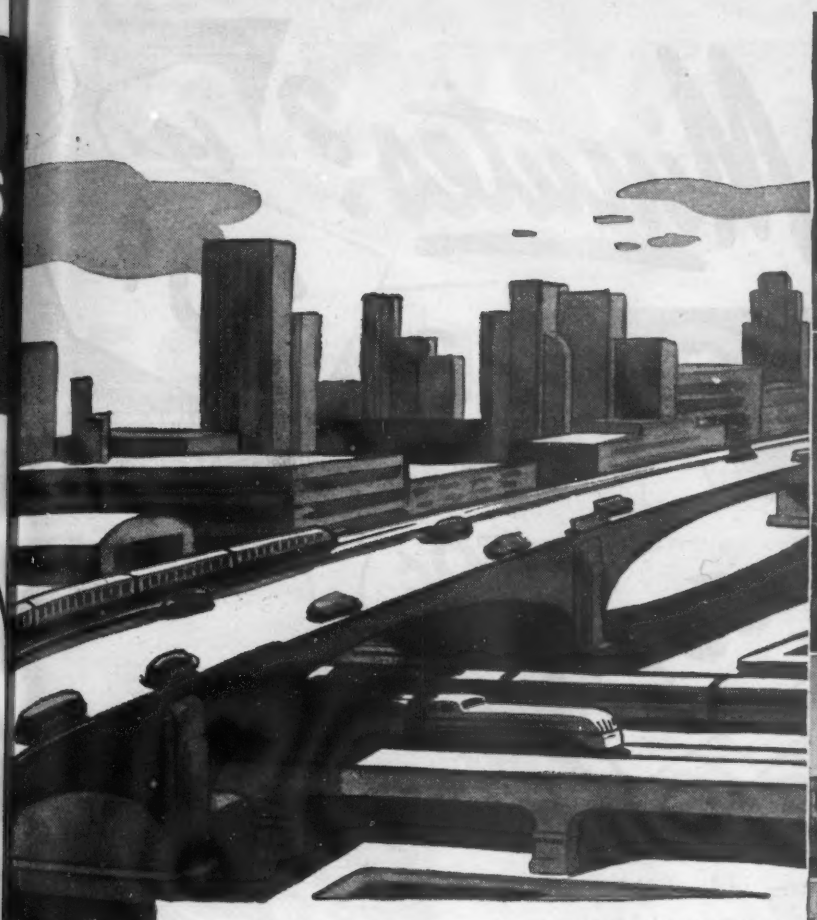

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The steadily increasing demand for Allied's precision workmanship from the very beginning has fostered the enlargement of its working area from 5000 square feet in one plant in 1915, to 275,000 square feet in four great plants today. This growth over a period of 30 years . . . steady and consistent . . . places Allied solidly on the main road of industry . . . establishes Allied as a standard source of precision tools and parts *in great quantity* for automotive, radio, home appliance, plastics, aviation, furniture, electrical, farm implement and many other mass production manufacturers. Send in *your* blueprints . . . or write to Allied, now.

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"IT'S AN ALLIED PRODUCT." In its four plants shown above—two in Detroit and two in Hillsdale, Michigan—Allied makes special cold forged parts, cap screws, etc.; hardened and precision ground parts; sheet metal dies (from the largest to the smallest); R-B Interchangeable Punches and Dies; jigs, fixtures, steam-heated plastic molds and special production tools.

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What's Your Price Tag on *Minutes!*

A minute's a small matter, indeed. But price the *minutes* it takes your people to write records, using old-fashioned, inefficient forms. Add these up in every department where records are kept, and chances are they're no longer just minutes—but *hours* of costly, unproductive time!

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"Compacting the grain" is no myth.

Closed dies in hammers of adequate capacity produce forgings of measurably superior toughness with no sacrifice of strength or hardness.

Ladish engineers are available for consultation on your post-war products.

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You get KNOWN

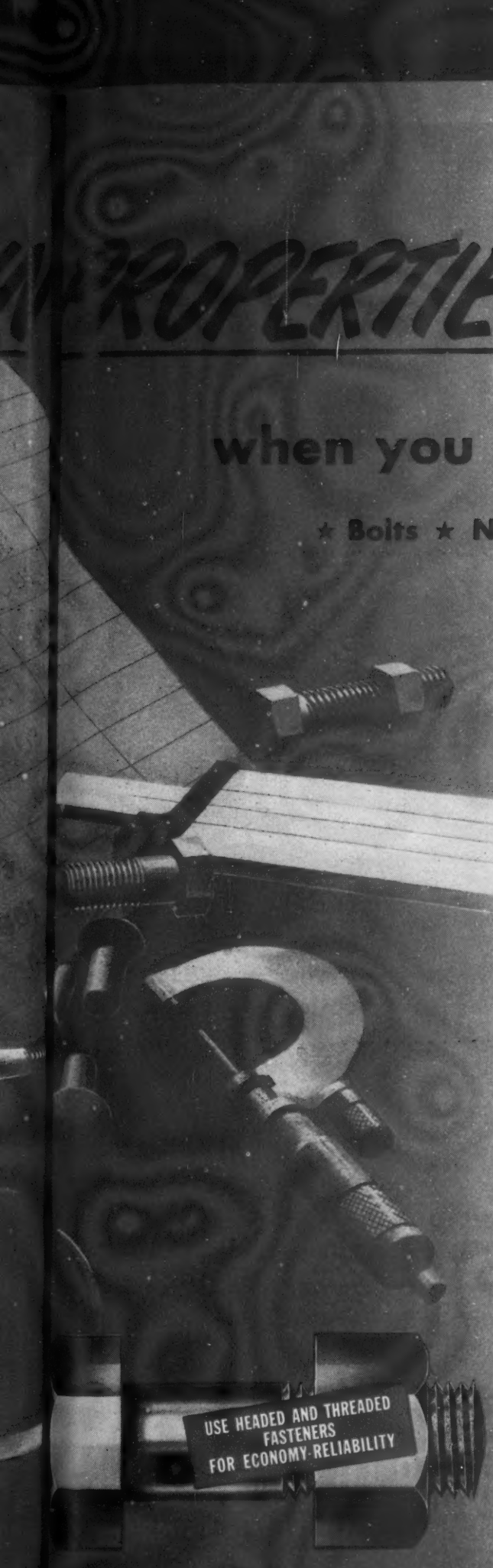
Recognized Standards

Simplify your Buying Practice

The Fasteners Industry offers you more than 400,000 items you can order by size and name! Standardization and accurate manufacturing methods permit you to buy and re-order parts from several sources if necessary, with full assurance that they will match and fit perfectly.

Furthermore, long usage has led to the development of various standardized fasteners for specialized jobs. Thus, through standardization and simplification of product lines, the Fasteners Industry makes your buying problems easier!

This Standards book contains dimensions, thread fits, weights, etc. of standard types and sizes of bolts, nuts, screws and rivets. 169 pages of data. Price $1.00.



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The basic engineering data available to you when you design for the use of standard Industrial Fasteners comes from the known properties of the products, and extensive test data on bolted and riveted joints. Sound engineering practice guides you in the correct and efficient use of fasteners.

Improvements in the design and manufacture of Industrial Fasteners have kept pace with the steady progress in metallurgical and production practice, so that today you have modern products and modern data to use in the fabrication of your equipment, machines or structures. And you have complete confidence in the soundness of the result.

Is your name on the list to receive FASTENERS? This free periodical contains useful data on the application of all types of Industrial Fasteners. Send name, title and address.

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INSTALLED FOR AN 8 HOUR DAY . . .

Now Operating 16 Hours Daily

This installation consists of two 24" conveyor belts, each 835 ft. long, running side by side on an incline. They are operating at one of the largest power producing plants in the Middle West. The installation was originally designed for an eight-hour day. Now, on account of the requirements of the war effort, the belts are being operated sixteen hours daily . . . and furthermore, the installation has been stepped up in belt speed about one-third.

All BWH conveyor belts are engineered and built to conform to certain definite conditions of speed, load and abrasion. Nevertheless, there is always present in BWH belts sufficient quality, stamina and inherent strength to pinch-hit on harder work if conditions demand, as is abundantly proven in this instance.

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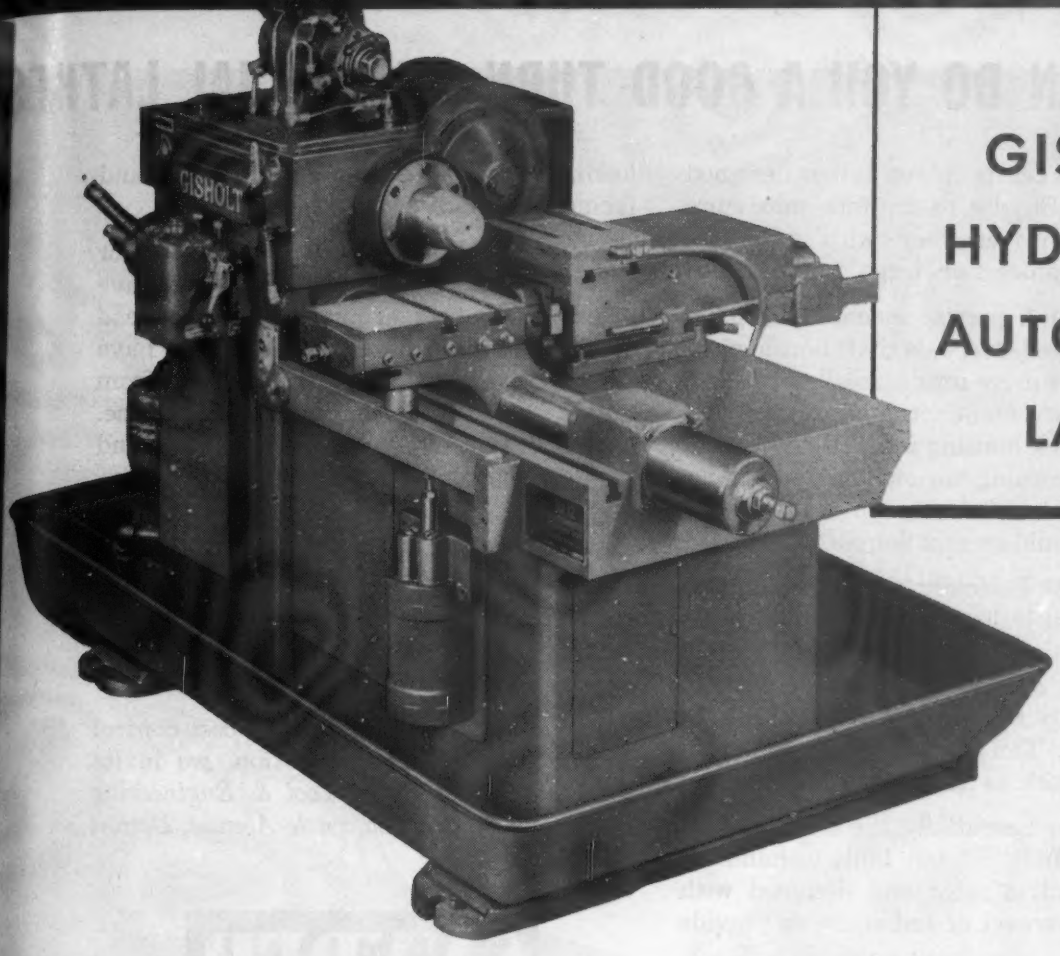


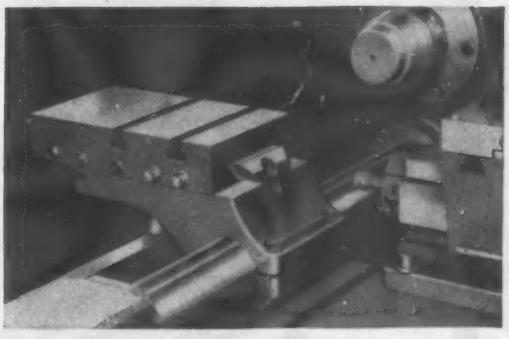
The GISHOLT HYDRAULIC AUTOMATIC LATHE

WHY IT HANDLES MORE JOBS

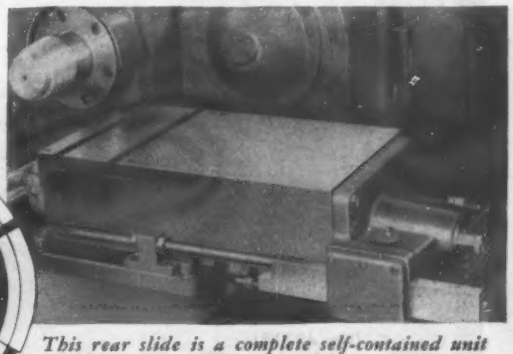
more easily

The reasons for the remarkable versatility of the Gisholt Hydraulic Automatic Lathe lie in its extremely simple design. And this simplicity also accounts for its easy change-over from job to job.

1. There is no changing of cams and gears for different jobs.
2. The front carriage can be clamped in any desired position, making it easy to arrange tooling to best advantage.
3. By simple nut adjustment, there is an infinite variety of feeds from .000″ to .058″ for either front or rear carriage.
4. Rapid traverse and feed stops are quickly and easily changed by simple, single screw adjustments.
5. In partial trial cuts, in change of set-up, it is not necessary to run the machine through its entire cycle. Front or rear tools may be operated separately and independently—may be arrested at any point and returned to starting position.



Note how front carriage is clamped upon a heavy, horizontal, circular bar. The wide, heavy top with T slots, permits mounting standard or special tool blocks in various arrangements. A graduated micrometer screw is provided for adjusting tools to diameter.



This rear slide is a complete self-contained unit which can be readily mounted in any position, to feed in any direction, and at any desired rate of feed.

The outstanding versatility of the Gisholt Hydraulic Automatic Lathe may be applied to a wide variety of chucking, between-centers and fixture-held work. Write for complete information.

GISHOLT MACHINE COMPANY
1217 East Washington Ave. • Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . . With Gisholt Improvements in Metal Turning

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

Snyder CAN DO YOU A GOOD TURN ON SPECIAL LATHES

Here are four center-driven lathes designed and built by Snyder to combine maximum production and accuracy with minimum handling in processing large heavy parts.

A. (No. 42595) A prewar machine for processing fabricated steel axle shaft housings for trucks. Center drive unit is small with short rear center movement actuated by air cylinders. Tail stock housing is rigidly mounted. Operations; turning various diameters near the wheel ends of the housing and facing numerous shoulders and flanges.

B. (No. 47826) Basically the same as Machine "A" but built to handle heavier, cast parts. Operations; turning with front tool blocks, facing and shouldering with rear tool blocks—which are reversible for rough or finish facing. Tail stop assembly slides in and out of work as an assembly.

C. (No. 43218) Essentially the same as Machines "A" and "B" but built to handle a cast armor plate rotor and designed with considerable travel of tail stock to provide loading space. Operations are turning and facing from both ends.

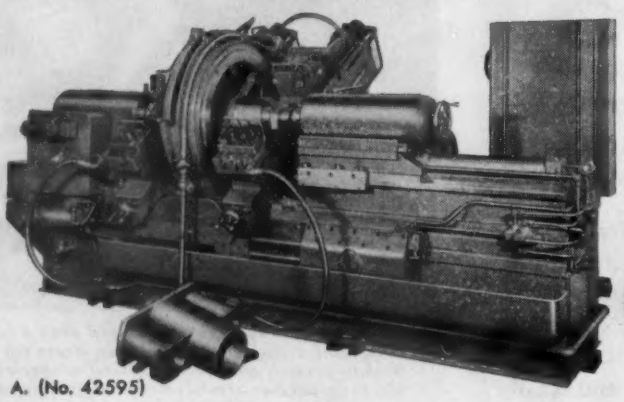
D. (No. 51113) For processing cast armor plate recoil housings. Rear tool slides have extremely long travel and conventional head stock and motor drive to center drive have been eliminated. Center drive is direct from motor and transmission in rear of machine. Operations; turning with front tool blocks and facing and shouldering with rear tool blocks.

All of these lathes are hydraulically operated and electrically controlled and operate on an automatic work cycle. The scope of operations and variety of parts indicate the versatility and flexibility of this type of Snyder special-purpose machine.

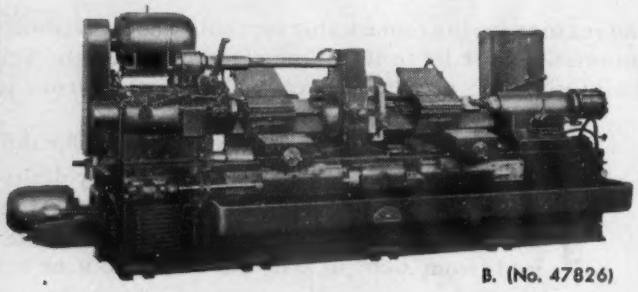
If you are interested in accurate cost-control in any metal-cutting operation, we invite your inquiries. *Snyder Tool & Engineering Company, 3400 E. Lafayette Avenue, Detroit 7, Michigan.*

20 Years of Successful Cooperation with Leading American Industries

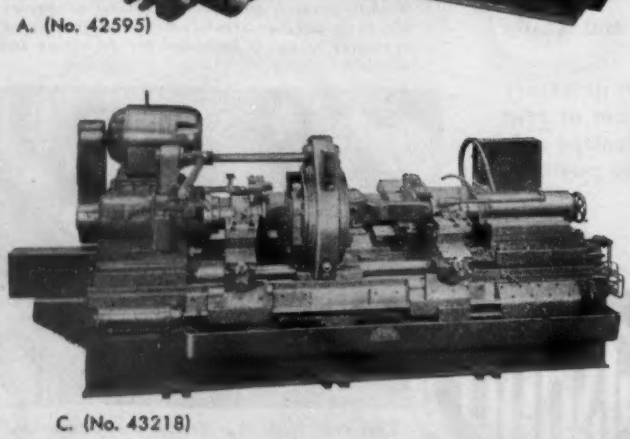
SNYDER
DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST



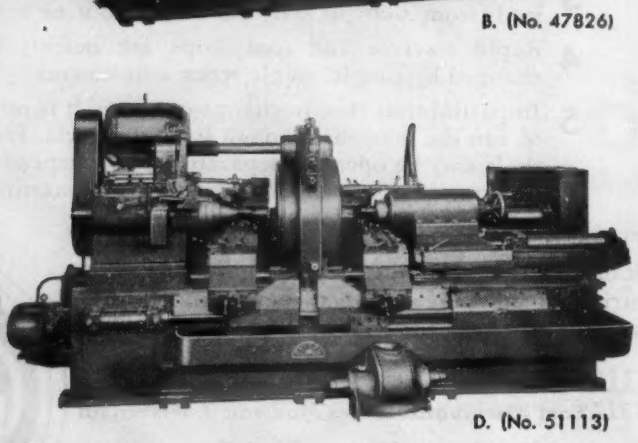
A. (No. 42595)



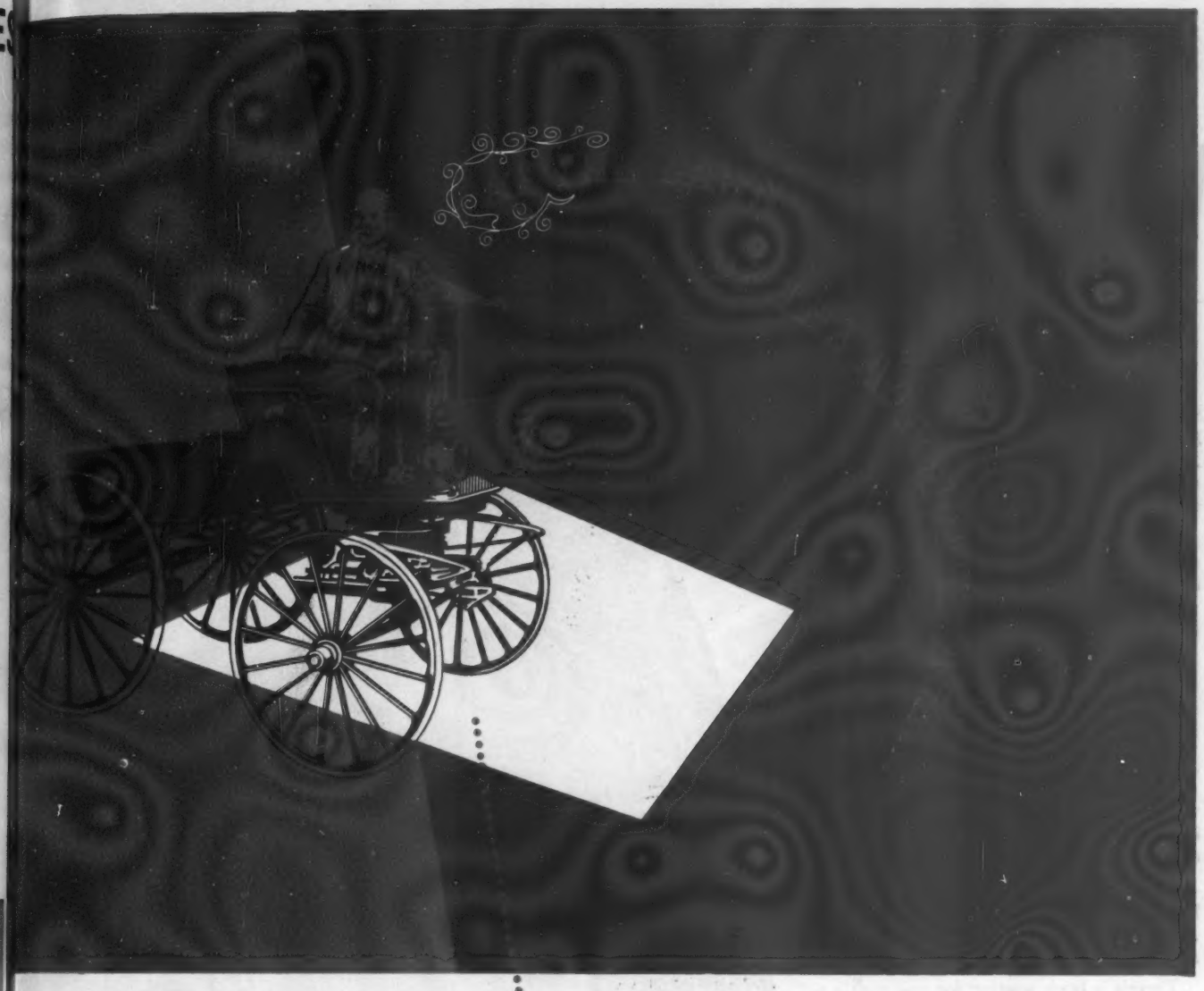
B. (No. 47826)



C. (No. 43218)



D. (No. 51113)



STANDARD STEEL installed its

first open-hearth steel furnaces

When automobiles were still one-lunged laughing stocks, Standard Steel celebrated its 100th anniversary by installing a ten-ton open hearth furnace . . . and continued its tradition of pioneering by serving the furnace with the first electric-driven charging machine to be installed commercially.

This move was made because Standard Steel recognized, even in this early day, that control of quality demanded *complete* control of all vital production operations.

This same policy has been followed consistently since, and accounts for the exceptional uniformity and properties that have made Standard forgings and castings outstanding. You'll find the best and easiest way to take care of your requirements is to "Standardize on Standard." The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Pa., U. S. A. Offices: Philadelphia, New York, Boston, Washington, Cleveland, Detroit, St. Louis, San Francisco, Houston, Pittsburgh, Chicago.

BLW THE BALDWIN GROUP

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STEEL FORGINGS & CASTINGS

Production Problems YOU CAN Forget WITH Veelos

A V-BELT that requires constant, time-wasting maintenance is a production handicap. You need NOT put up with it . . . when you can replace with Veelos—the adjustable V-belt. Then—you can *forget* these power transmission worries:

1. Lengthy Machine Shutdowns to Permit Belt Replacement: With Veelos in rolls, V-belts can be replaced in a few minutes . . . maintaining machine production . . . reducing machine downtime.

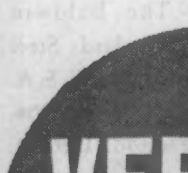
2. Belt Slippage: Veelos link construction provides quick, easy tension adjustment to end slippage . . . keeps machinery running at full speed and productivity.

3. Uneven Delivery of Power on Multiple Drives: Easy adjustment of Veelos assures that each strand of a multiple belt will carry its exact share of the load. All strands constantly work together, *delivering full power.*

4. Bulky, Expensive Belt Inventories: Veelos lowers investment in V-belt stock and space . . . rolls of common sizes provide belts of any desired length . . . simplify stock records.

There's a book waiting for you that's a guide to easier belt maintenance and installation. It's the *free 8-page illustrated manual* giving Veelos applications, construction detail, installation directions and engineering data. *Write for your copy today.*

Simple as Buttoning a Shirt



Get the "hang" of it, and you'll couple and uncouple Veelos as easily as you button your shirt. This unique, link construction is the big reason why production goes up when Veelos goes on.

Link Construction Ups Production

VEELOS
THE LINK
V-BELT

Adjustable to any Length
Adaptable to any Drive

MANHEIM MANUFACTURING & BELTING CO.
MANHEIM, PA.

Just what you've been looking for—

A Zinc Coated Steel Sheet that STANDS ROUGH TREATMENT

Republic

ELECTRO PAINTLOK

And rough treatment it is, when you make parts like these from zinc coated steel sheets.

A circular section is dished in one direction, then drawn back severely in the opposite direction. And even under this punishing treatment, Republic ELECTRO PAINTLOK Sheets do not crack, peel, flake or powder.

Here again is proof that the only limit to fabricating these electrically coated, chemically treated sheets is the workability of the base metal.

But there's more to the story. Republic ELECTRO PAINTLOK Sheets end the old, troublesome problem of securing tight and lasting adherence of a film of paint on a zinc coated surface.

Take the first step now toward greater sales and profits by getting all the facts on how Republic ELECTRO ZINC PLATED Sheets can improve YOUR product. Write us.

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Republic Electro Zinc Plated Sheets include ELECTRO PAINTLOK in widths up to 60 inches and gauges from 12 to 24, and ELECTRO ZINCBOND in widths up to 48 inches and gauges from 25 to 37.

Republic

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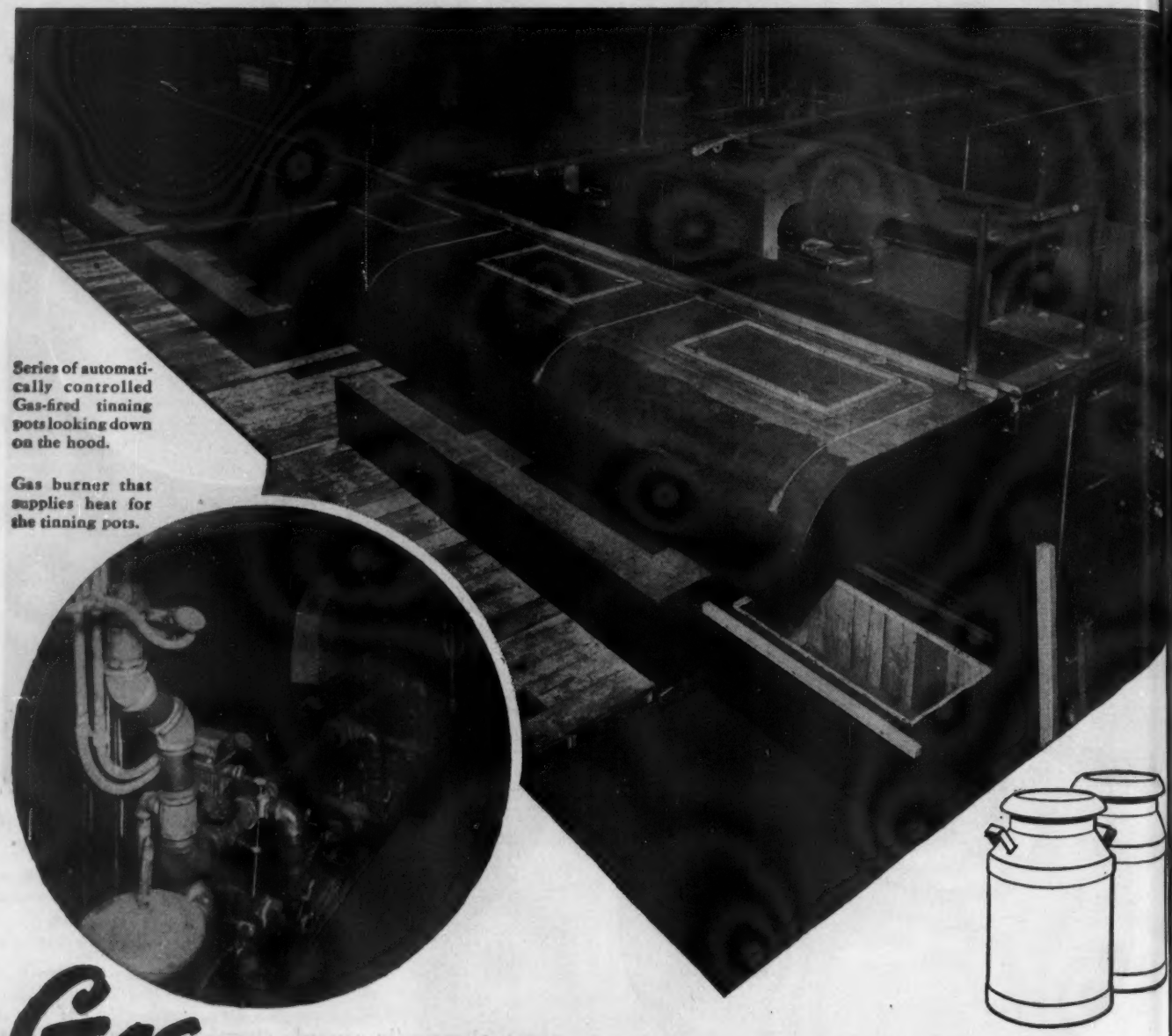
PRODUCTION FOR VICTORY

ELECTRO ZINC PLATED SHEETS

Electro Paintlok • Electro Zincbond

Other Republic Products include Carbon, Alloy and Stainless Steels—Sheets, Strip, Plates, Bars, Pipe, Tubing, Bolts and Nuts, Wire, Fabricated Products



Series of automatically controlled Gas-fired tinning pots looking down on the hood.

Gas burner that supplies heat for the tinning pots.

GAS precision control helps manufacturer save precious tin—and brings other advantages

Buhl Manufacturing Company, Detroit, recently switched from solid fuel to Gas for firing a group of pots in their "tinning" line where a wide variety of dairy ware is coated. They were seeking closer control of temperature with greater uniformity of heating so that each piece would secure the same coating, and waste of precious tin be avoided.

Not only does this manufacturer secure temperatures within 5°, plus or minus, of those desired—unheard of with the previous fuel, but other advantages were gained. A unit of work which formerly took 55 minutes, now requires only 45 minutes. Fuel costs have been reduced 15%, working conditions are vastly improved and greater cleanliness prevails.

And with automatic Gas temperature control of individual pots, it is possible to vary the quantity of work passed through the tinning line while temperatures remain constant. Shifts in temperature, either up or down, for handling light or heavier metals are effected much more rapidly than was the case before.

You, too, will find that the advantages of Gas are many. Your local Gas Company's Industrial Gas Engineer will be glad to point them out.

AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

THE TREND IS TO GAS
FOR ALL INDUSTRIAL HEATING

HEADQUARTERS FOR FACTS

about Used Machines

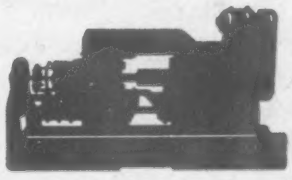
The value of a used Acme-Gridley Automatic as a production machine depends not on its catalog description, but on what it can turn out *today*.

For the facts, look to the men who design, build and tool these machines. They really know.

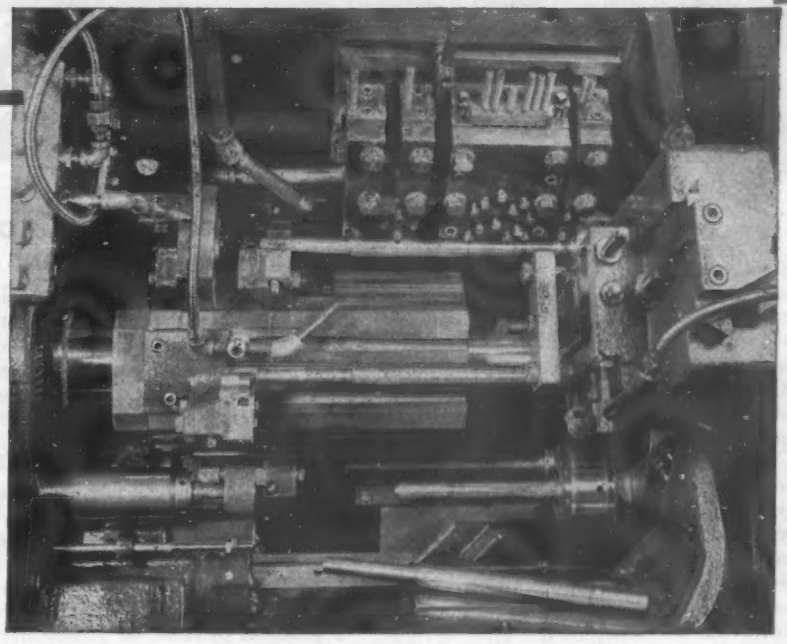
They can tell you if the "surplus" machine you might think of buying has been overworked or under-cared for. And whether it is a good buy at the reduced price, or at any price.

It pays to remember that the purchase price of any machine tool, old or new, must come back to you through production.

So, we urge you to seek competent advice before buying. Then buy a used Acme-Gridley *only* if it will help you reduce your cost of manufacture. Buy only machines that will improve your position, by cutting costs, in the highly competitive markets that are ahead.



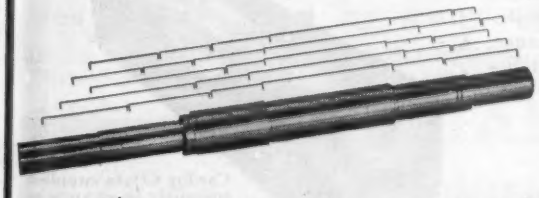
ACME-GRIDLEY BAR and CHUCKING AUTOMATICS maintain accuracy of the highest spindle speeds and fastest feeds modern cutting tools can withstand.



A CASE OF COST REDUCTION

Acme-Gridley tooling makes it possible to machine all diameters of this motor shaft on one set-up, with high precision and concentricity. Time saved in set-up, in turning and investment—no one-purpose shaft machine to buy.

Sketch indicates the variety of shaft work that can be done with one set of tools, on the standard Acme-Gridley Bar Automatic.



THE NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

PUT CARDOX FIRE PROTECTION ON YOUR *Reconversion* PLANS

Effective fire protection is a "must" to insure uninterrupted development of production needed to win and hold leadership in big peace-time markets. If your plant presents tough fire hazards, call on a Cardox representative *now* for practical help in safeguarding vital operations, equipment and materials.

These fire protection specialists are backed by the full resources of the Cardox Research Division and Engineering Department. They will bring to your problem the wide experience gained in developing fire extinguishing systems that have set a new high standard of protection for many of the most severe hazards in American industry. Their analysis will cover all engineering factors involved. It will include a careful study of the nature of each hazard . . . fire characteristics of combustibles and operations . . . type of application, and quantity of extinguishing medium for most effective extinguishment. This analysis costs you nothing . . . may prevent a disastrous fire at the most critical period of your business history.

CARDOX Harnesses CO_2 in POUNDS or TONS

The features that have made Cardox Fire Extinguishing Systems so outstanding are many: For example, Cardox harnesses carbon dioxide in *pounds* or *tons*, and makes this fast, inexpensive, non-damaging extinguishing medium equally effective for large or small hazards. Furthermore, through engineered application and control, the well-proved advantages of carbon dioxide are given enhanced extinguishing performance that includes increased cooling effect, effective projection through relatively great distance, and uniform extinguishing characteristics regardless of plant or atmospheric conditions.

Before fire strikes to endanger your post-war plans, find out how Cardox has broadened the performance scope of carbon dioxide.

Drop us a line for Bulletin No. 810 and an analysis of your fire hazards.

CARDOX CORPORATION
BELL BUILDING • CHICAGO 1, ILLINOIS
New York • Philadelphia • Washington • Pittsburgh
Cleveland • Detroit • Houston • Seattle • San Francisco
Los Angeles • San Diego

Cardox CO_2 is supplied instantly in pounds or tons from a single Storage Unit containing 500 pounds to 125 tons at controlled low temperature of 0°F. and 300 p.s.i.

CARDOX
CO_2 FIRE EXTINGUISHING SYSTEMS

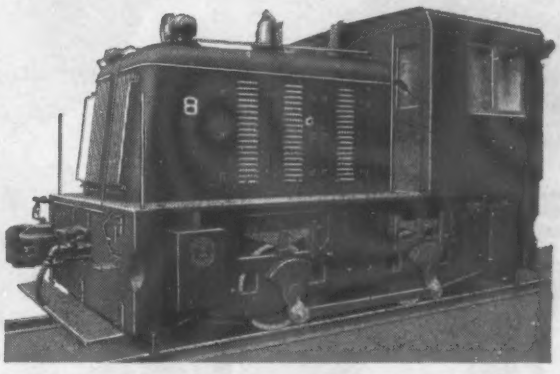
70-ton, standard-gauge Diesel-Electric Locomotive for large steel company. Equipped with two complete power plants, four traction motors and dual control for operation with equal convenience from either side of the cab.

Diesel-Electric Locomotives

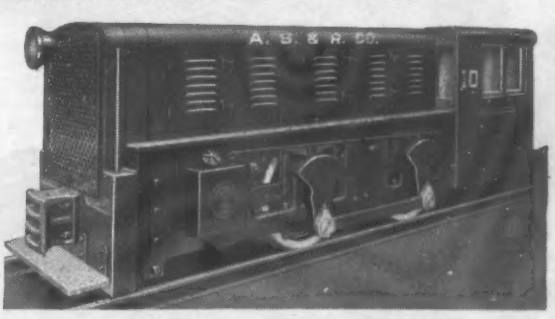
to meet Specific Requirements

Like all other types of locomotives the Diesel-Electric can only attain its highest degrees of efficiency and economy when precisely suited to the work required and to the conditions under which it must operate. For this reason Vulcan has standardized its designs to only a limited extent—leaving its engineers free to cooperate with the purchaser's engineers or executives in modifying clearances, body designs, gear ratios, etc., to meet their specific requirements.

As indicated by the examples here illustrated this policy of "flexible standardization" usually enables us to give better service than would otherwise be possible and has aided materially in establishing the high esteem with which Vulcan Diesel-Electric Locomotives are regarded by many well-known users. Detail promptly on request.



25-ton, 60"-gauge, Diesel-Electric Locomotive for service in the Canal Zone. Equipped with one complete power-plant, one traction motor and counter-balanced side rods.



14-ton, 24"-gauge, Diesel-Electric Locomotive for large smelting company. Equipped with one complete power plant, one traction motor, and counter-balanced side rods. Designed to operate under conditions of limited height and width.

VULCAN IRON WORKS

Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Steam Locomotives	Rotary Kilns, Coolers and Dryers	Toothed, Double-Roll Crushers	Heavy-Duty Electric Hoists
Diesel and Gasoline Locomotives	Rotary Retorts, Calciners, Etc.	Heavy-Duty Briquetting Machines	Self-Contained Electric Hoists
Diesel-Electric Locomotives	Improved Vertical Lime Kilns	Ball, Rod and Tube Mills	Scraper-Loading Hoists
Electric Locomotives and Larrys	Automatic Quick-Lime Hydrators	Shaking-Chute and Chain Conveyors	Cast-Steel Sheaves and Gears

Your greatest single saving

THREAD FORMING and SHEET METAL SCREWS
LAMSON Products
MACHINE SCREWS and STOVE BOLTS
Specify LAMSON PRODUCTS
THE LAMSON & SESSIONS COMPANY

Machine screws and Thread Forming screws are completely described in these two new file size folders, with list prices and valuable engineering information. Write for your copies.

.....IN USING LAMSON LOCKWASHER SCREWS..*IS TIME*..AND SAVING TIME SPEEDS PRODUCTION, SHIPMENTS, SALES

You save time in *not having to match* lockwashers to screws, more time in *not having to place* lockwashers on screws, and still more time in *not having to inventory and handle* separate stocks of lockwashers and screws. This time-saving feature is one you cannot escape enjoying. You simply order the proper size screw you want, the type and size lockwasher you need, and then you get them together, as a unit. And of course you apply them as a unit—manually or with automatic hopper-feed screw drivers. And in dis-assembly as in assembly, this time-saving, temper-saving feature works for you all the time. You simply cannot lose the time-saving feature this fastening insures by its use.

Time-studies are not needed to demonstrate that reaching for a screw and reaching for a lockwasher separately takes more time than reaching for both at once when joined inseparably together. It's just good business to use them where possible because of the time-saving bonus you get on your assembly costs. And incidentally their cost is little or no greater than if lockwasher and screw are purchased separately!

Until now most of Lamson's lockwasher screws were going into war material, for saving time was one of the most effective weapons we had and saving time in making repairs, adjustments and replacements contributed to faster movement of supplies to fighting fronts. More than ever before, this time-saving feature will be important to you in your future production.

A new folder is ready for you providing complete information, lists and stock sizes of Lamson lockwasher screws. Ask for it with the convenient coupon below. Samples will be sent on request.

THE LAMSON & SESSIONS COMPANY, General Offices: Cleveland 2, O.
Plants at Cleveland and Kent, Ohio; Chicago and Birmingham

"BOLTS, NUTS & SCREWS"—1944 REVISION. Cloth bound. Limited edition, 180 pages of technical, practical information. Sent prepaid for *$1.00—cash or check must accompany your order.*

"BOLTS ARE IMPORTANT!"—24-page booklet of currently useful information for buyers of headed and threaded products, and describing Lamson & Sessions' specialty fastenings which have wide industrial applications *—now, and in the post-war period. Sent gratis.*

"THE LAMSON BLUE BOOK"—is our standard Catalog of standard products excepting our Aircraft products. *Sent gratis.*

"SIMPLIFIED STOCK LIST"—Of bolts, nuts and screws, conforming to latest revisions of the Office of Price Administration, and of great value in showing you in what ratio quantities of various standard products are kept in stock for deliveries, by your jobbers and in our own (and other bolt manufacturers') warehouse stocks. *Sent gratis.*

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Please send us ☐ Lamson Blue Book ☐ Bolts, Nuts and Screws ($1.00)
☐ Bolts are Important! ☐ Simplified Stock Sizes

Send information on ☐ Cap Screws and Set Screws ☐ Cotters
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Name of Individual — Title or Kind of Work

Employed by (Name of Company)

Street Address

City and State

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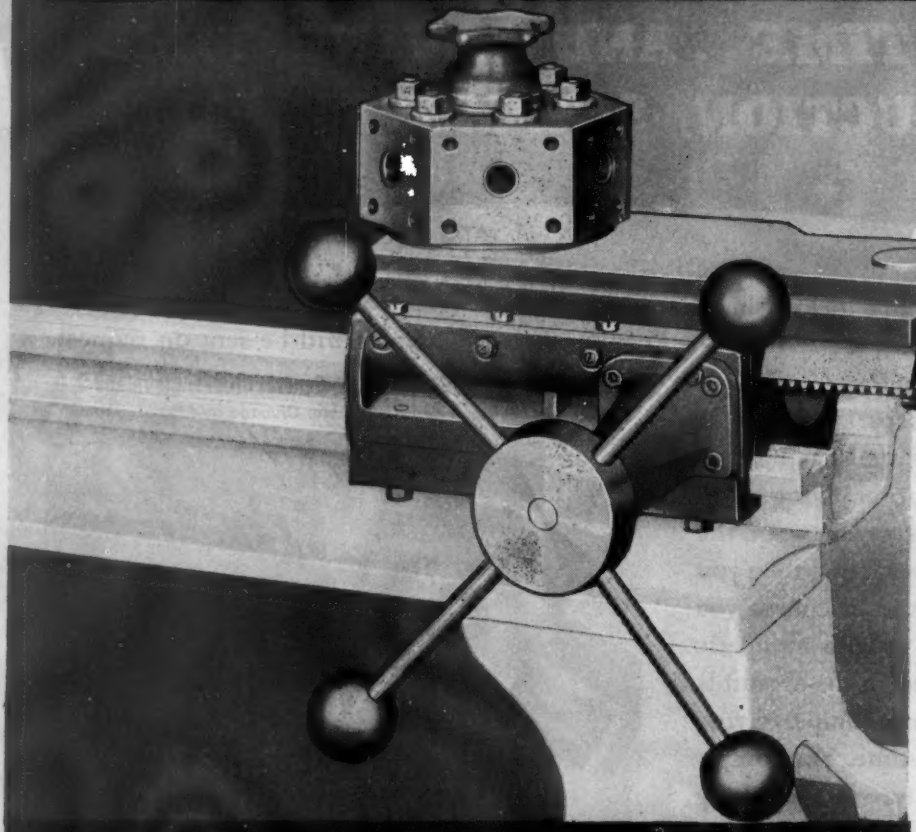
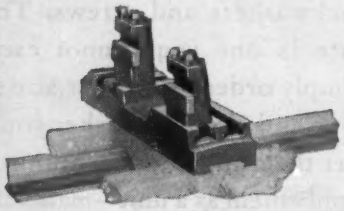
Your Jobber Stocks the Lamson Line

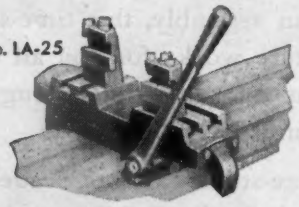
Logan A NAME TO REMEMBER WHEN YOU THINK OF BETTER LATHES





No. LA-29

No. LA-25



NEW TURRET ASSEMBLY

BUILT BY *Logan* FOR *Logan* LATHES

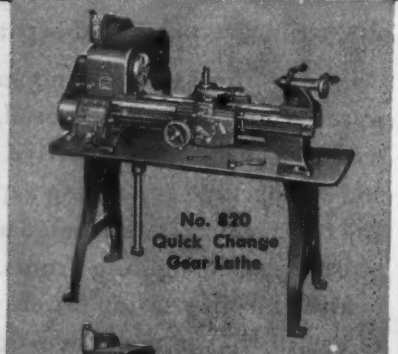
Heavier, More Versatile, More Accurate, Easier to Handle

DOUBLE TOOL POST CROSS SLIDES

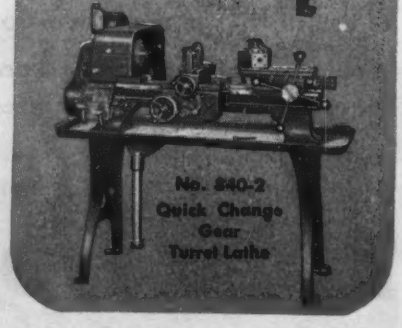
For use in connection with the Turret Assembly. No. LA-29 is interchangeable with the Compound Rest. No. LA-25 also fits the bed of all Logan Lathes.

THE new Logan Turret Assembly is now standard equipment on Logan Turret Lathes, and is also available as a separate assembly. Designed by Logan for Logan Lathes, this assembly is interchangeable with the tailstock, providing an efficient, economical means of converting a Logan Screw Cutting Lathe for turret lathe production. Built to Logan standards of precision workmanship, and heavier in its overall construction, this new Logan Turret Assembly assures smoother and more accurate cutting with longer tool life. Its hexagonal block design permits mounting tools on face of block as well as in standard bored holes, thus providing more versatility in operation. Pilot wheel operation permits easier and more positive control of the cutting tool. The turret lock insures greater rigidity and increased accuracy, especially on heavier cuts. The assembly is furnished rough bored for either 5/8" or 3/4" finish bore turret holes. It is also available with a lever operated turret for more rapid action on light work.

BRIEF SPECIFICATIONS... Distance across turret head flats, 5¼"... Center of tool holes to top of slide 1⅛"... Six positions with adjustable stops... self-indexing... maximum stroke of turret 4¼" adjustable gibs on slide. G-1



No. 820 Quick Change Gear Lathe



No. 840-2 Quick Change Gear Turret Lathe

LOGAN ENGINEERING CO.

CHICAGO 30, ILLINOIS

join metals on a production basis at lowest cost per piece
...Taylor-Winfield Rocker Arm Spot Welders with the

FLEXIBLE "PRODUCTION ZONE"

UNIVERSAL HORNS—VERTICAL OR 30 DEGREE POSITION
ANGLE HORNS—30 DEGREE POSITION
STANDARD HORNS—VERTICAL POSITION
HORNS CAN BE ROTATED, MOVED SIDEWAYS, OR ADJUSTED UP AND DOWN
REDUCED SET-UP TIME

When machines go down, to change set-up for example, cost of production goes up.

Taylor-Winfield did something about this set-up time several years ago. They added flexibility to the "production zone" of a highly standardized welder of proven basic design.

As a result, when you change over your production on a Taylor-Winfield welder for size, shape or other reason, you reset or adjust only the "working zone" (electrodes and fixtures), not the entire welder.

With this flexibility, you obtain more welds per hour and the same quality of weld, day after day, month after month. Result—low-cost repetitive joining of metals.

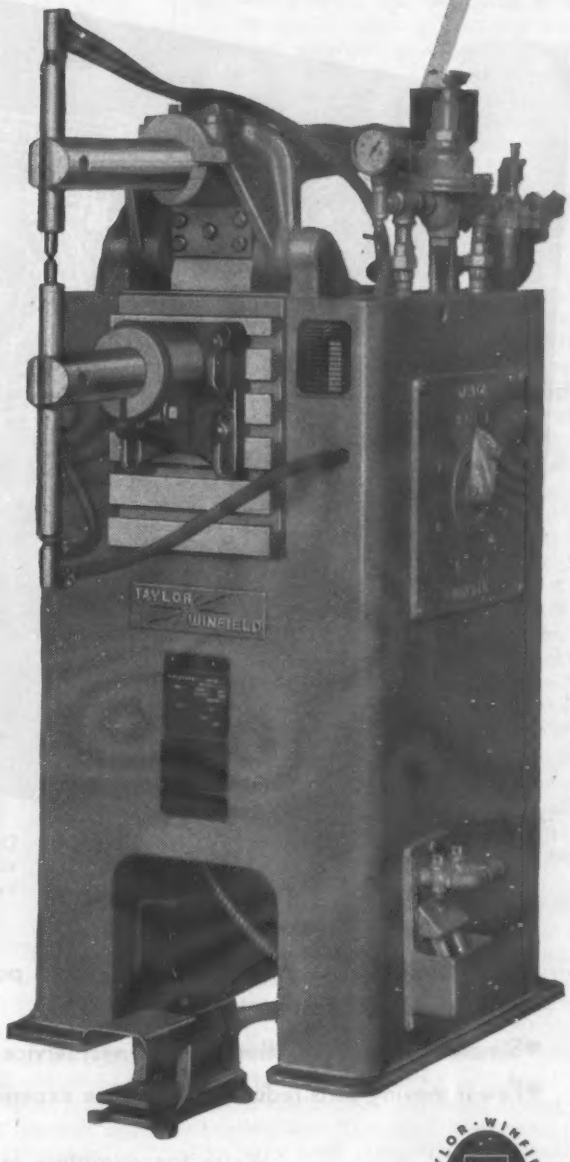
Taylor-Winfield applies the flexible "production zone" to all types of resistance welders (spot, seam, projection, flash-butt). Check your requirements with Taylor-Winfield.

ADVANTAGES OF SPOT WELDING

Can be applied to a wide range of gauges of weldable metals, including hardenable steels, such as medium carbon.

Low-cost production whether you use one or a battery of Taylor-Winfield Rocker Arm Spot Welders.

Does not require highly trained operators . . . Machines require minimum floor space . . . Adaptable to wide range of shapes and sizes of work.



One of several types of Taylor-Winfield Rocker Arm Spot Welders, made in foot, motor, or air operated.

TAYLOR-WINFIELD RESISTANCE WELDERS

The Taylor-Winfield Corporation
WARREN • OHIO

The Taylor-Winfield Corporation
Warren, Ohio
Send us bulletin on spot welders

Name _____

Company _____

Address _____

City _____ State _____

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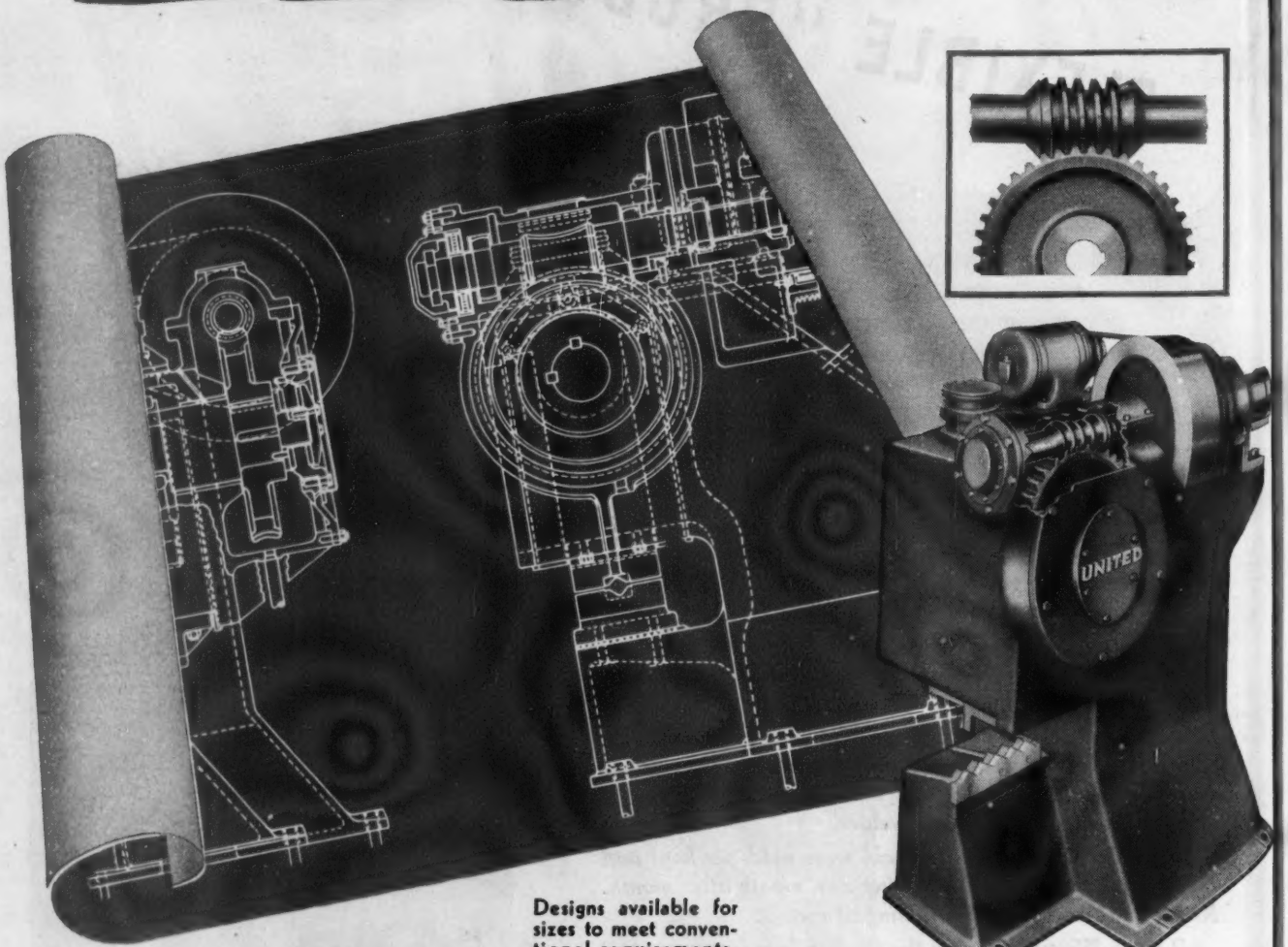
Cone Worm Driven VERTICAL SHEAR



Designs available for sizes to meet conventional requirements.

- CONE WORM GEARING assures uniform power . . . smooth, quiet operation.
- Simple rugged construction assures longer service life.
- Fewer moving parts reduce maintenance expense.
- New compact design materially reduces overall dimensions.
- Fully enclosed gears.
- Forced oil lubrication.
- Equipped with either straight or grooved knives.

Write for complete technical data or consult our engineers concerning special designs for specific requirements.

United Engineering and Foundry Company

Pittsburgh, Pennsylvania

Plants at PITTSBURGH • VANDERGRIFT • NEW CASTLE • YOUNGSTOWN • CANTON
Subsidiaries: Adamson United Company, Akron, Ohio
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**The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment*

Advertisement OCTOBER, 1945

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Now is the Time to Modernize Metal Specifications

During the months ahead industry is faced by tremendous problems. Thousands of factories must reconvert for peacetime production to meet the greatest demand for goods in the history of our country. Obsolete or worn out machinery must be discarded and new equipment installed. Whenever necessary, methods must be brought up to date and improved. Metal specifications must be subjected to the most searching examination to determine whether the best possible material is being used. Engineers and designers must bring themselves up to date by finding out what new alloys have become available, what improvements have been made in existing alloys and the engineering properties of these modern alloys.

Requirements are more severe, and the demand is for materials capable of taking more punishment. The war period has acted as a proving ground. Restrictions in materials and labor necessitated the use of machines and equipment beyond their rated capacities. Both design and materials either proved themselves or fell by the wayside. In many cases new materials, some of which may have been intended for substitute purposes, proved superior to long-established metals and alloys. Today engineers are setting higher standards for both design and material specifications.

Progress in Copper-Base Alloys

The non-rusting properties, workability and other fine characteristics of copper-base alloys have been known for generations. However, it may not be generally realized to what extent copper-base alloys have been endowed with the engineering properties of dependability, high strength, exceptional resistance to wear and corrosion, and high fatigue resistance. As a result of this progress new horizons have been opened for brasses and bronzes and their usefulness greatly extended into wider fields.

Wide Range of Alloys Available

No longer must engineers or designers choose rustable material simply because high strength is required or put up with moderate strength because workability is necessary. Through metallurgical research and advances in processing methods and equipment, a wide range of engineering copper-base alloys is available to help manufacturers produce a dependable, uniform product at a price which will permit reasonable profits.

Bridgeport has much to offer not only from the standpoint of modern engineering alloys such as the Duronzes, cupro nickel and improved phosphor bronzes, but also a complete line of quality brass mill products for the thousands of applications which they can fill best.

Bridgeport Brass Technical Handbook

To bring the design engineer, metallurgist, and purchasing agent up to date on the various copper-base alloys that are available; their physical, chemical and mechanical properties; and the specifications which apply to them Bridgeport Brass Company has published a 128-page technical handbook which is soon to be released to the trade.

The technical handbook deals briefly with general information such as the useful properties which have made copper-base alloys a part and parcel of modern civilization; the results of current research and development and the new engineering alloys that are available. Also included is the copper-zinc alloy system and the effect of additional elements such as lead, tin, aluminum, silicon, iron, nickel, arsenic, etc. on the properties of copper-base alloys. The effect of annealing and cold working on the microstructure and physical properties of brass is discussed. The tempers of rolled flat products and drawn tubing are explained in detail and should be very helpful in understanding metal specifications. The causes and prevention of stress corrosion cracking and hot breaks are also included.

Since lubricants have an important bearing on metal working, space is devoted to the various types and characteristics of lubricants used for blanking, cupping, drawing, forming and machining. A chapter on metal cleaning discusses solvent cleaning, degreasing, alkaline scouring, emulsion scrubbing, electrolytic cleaning and tarnish removal. The most common acid cleaning formulae are also given. A brief discussion of drawing tools for sheet metal is included.

For simplification and easier understanding alloys have been grouped on the basis of their application. In the strip and sheet section, for example, we have nine alloys ranging from high brass to oxygen-free copper, which are suitable for drawing, spinning and stamping. Each of these alloys is briefly described as to composition, special characteristics and applications. This is followed by a table which shows seven of these alloys side by side. The table gives the complete analysis, mechanical properties such as tensile strength, yield strength, elongation and Rockwell hardness; physical constants such as melting point, density, coefficient of thermal expansion, thermal and electrical conductivities and modulus of elasticity. Under fabrication properties are given machinability ratings, cold and hot working characteristics and hot working range. Also included are the specification numbers such as ASTM, Federal, Navy, etc. to which these materials belong.

Other groups of alloys under the strip and sheet section are engineering alloys for drawing, spinning and stamping, leaded brass strip, corrosion resisting tin brasses and spring metals.

In the rod and wire section the alloys are grouped under headings such as rod and tubing for screw machine operation; rod and wire for cold heading, rods for hot forging and welding rod. Tables similar to those under the strip and sheet section have been compiled with each group of alloys.

In the section devoted to tubing, the various methods for processing tubing are described and illustrated. The various alloys have been grouped under headings such as tubing for fabrication, condenser and heat exchanger tubing, duplex tubing, brass and copper pipe and copper water tubing.

To make this handbook still more useful numerous tables showing comparison of wire gauges, fractions of an inch, temperature conversions and weights of strip, circles, rod, wire and tubing and similar data have been included.

Our object is to distribute this handbook widely among purchasing agents, engineers, designers, metallurgists and chemists, who are active in the non-ferrous metal working field. Requests should be made on company stationery.

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

This article is one of a series of discussions by C. L. Bulow, research chemist of the Bridgeport Brass Company.

CREVICE CORROSION—PART 3

In the last two articles on causes of corrosion we discussed the mechanism of crevice corrosion and listed typical examples. Crevice corrosion occurs in those spaces formed by particles resting on metal surfaces, threaded connections, nails driven into wood, points of contact, corners, mechanical joints, etc. We shall now consider in greater detail various procedures which have been used to eliminate crevices or to prevent a corrosive liquid from getting into the crevice. Some of the problems connected with crevice corrosion have not yet been solved. It is hoped that this discussion will suggest means of overcoming these difficulties.

Prevention of Crevice Corrosion

A brief description of a few methods which have been used to overcome crevice corrosion follows:

1. Wire screens, filters and settling tanks are intended to prevent foreign material from settling out on metal surfaces.

2. Plastic, rubber or metal sleeves which are either permanent or can be periodically replaced will protect metal tie rods and bolts touching wood and passing through wood in vinegar and pickling tanks.

3. A substantial increase in metal thickness or the use of a plastic or metal sleeve in critical areas of cables, sheathes and piping resting on moist duct walls and planking may materially lengthen the time before failure occurs.

4. Heavy, viscous, tacky material such as tar-like substances, have been used to eliminate the crevice between metal roofing and wood. Also, changes in design may prevent the retention of water between the roofing in contact with wood.

5. Oil with or without corrosion inhibitors is widely used to keep water out of the interior of wire rope, cable and stranded wire. Frequently, it is necessary to resort to the use of more corrosion resistant materials.

6. The most corrosion resistant material usually is resorted to in order to prevent or keep to a minimum crevice corrosion of wire gauze or screen where the wires cross one another. Under some conditions, additional protection can be obtained through the use of paint or lacquer.

7. Heavier sections are installed locally in such structures as tanks and heat exchangers, in order to lengthen the life of the structure. The elimination of crevices through proper design is of great importance. Welded, soldered or filled joints aid in preventing crevice corrosion between piping and fittings, nuts and bolts, etc.

8. Welded, soldered or filled joints have, in many instances, replaced riveted joints. For many applications it has been shown that the weld line corrodes at a rate no greater than that of the plates on each side of it.

Bridgeport's Improved Phosphor Bronze for Longer Lasting Spring Contacts

In such applications as switches, radio and radar equipment, jack plugs, automatic controls and similar parts, more generous use of the finest phosphor bronze available does not appreciably affect the cost of the article, but increases its dependability and service life immeasurably.

Volume control by P. R. Mallory and Co., Inc. Contact arm is made from Bridgeport's Improved Phosphor Bronze.

Illustrated above is a volume control made by P. R. Mallory and Company, Inc., who have this to say concerning the requirements for the spring contact arm:

> "Long life, good current carrying characteristics, constant dependable spring pressure and flexibility in plating finishes."

Bridgeport's improved phosphor bronze, when made into properly designed springs can withstand millions of cycles of flexing without failure. It possesses high tensile and yield strengths as well as exceptional corrosion resistance. From the manufacturers' standpoint it is a practical alloy because it can be readily formed into complex shapes. Other applications for Bridgeport's improved spring phosphor bronze are diaphragms, bellows for radiator valves and steam traps, etc. Phosphor bronze is also used for engineering applications such as clutch discs and equipment in paper mills and water works and sewerage plants.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Trolley Safety Tap for trolley-powered equipment consists of copper hook, bronze fuse receptacle inside an insulated handle at the hook end and interior connection to a second similar receptacle for attachment to a cable connector at the outer end. The hook hangs on a trolley line. **No. 634**

New Bearing Assembly employs a porous bronze bushing pressed into a spherical body that is held in a pressed steel, two-piece housing. The bushing holds approximately one-third of its volume in lubricant, supplied by oil cup and wick. The bushing is shouldered on one side to provide a thrust surface. It comes in eight shaft sizes. **No. 635**

Instrument Measures Stiffness of flexible sheet materials to ⅛" thick. Provides initial reading, checks ability of material to sustain deflection, and provides readings in arbitrary units, on which to figure resilience. Maximum range is 0 to 10,000 stiffness units. **No. 63**

Motor Generator Providing different specified DC voltages from 12 to 2,000 volts is claimed to be light in weight, space saving, and to have fine voltage regulation and to meet low ripple requirements. **No. 637**

Portable Vacuum and pressure unit for gas or air operates many kinds of apparatus for temporary or test purposes. Handles from one to five cubic feet of air at pressure up to 10 pounds. **No. 638**

Simultaneous Readings of both amperage and voltage are taken with a new instrument measuring from 0.2 to 500 amps in 8 current ranges, and from 30 to 600 volts in 3 ranges. **No. 639**

Identical Halves of a new electrical connector slide together in jack-knife fashion and lock in a positive position with a slight pull. **No. 640**

An Electrically Heated compound kettle complete with motor driven agitator and full automatic controls and electrically heated discharge valve is used for melting transformer compounds, asphalts and resins. **No. 641**

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT 2, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—*Brass, bronze, copper, Duronze,* for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers, oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

"Bridgeport" BRASS

Established 1865

BRASS, BRONZE, DURONZE WIRE—For cap and machine screws, wood screws, rivets, bolts, nuts.

DURONZE ALLOYS—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware: *hot rolled sheets* for tanks, boilers, heaters, flues, ducts, flashings.

COPPER WATER TUBE.

FABRICATING SERVICE DEPT.—Engineering staff.

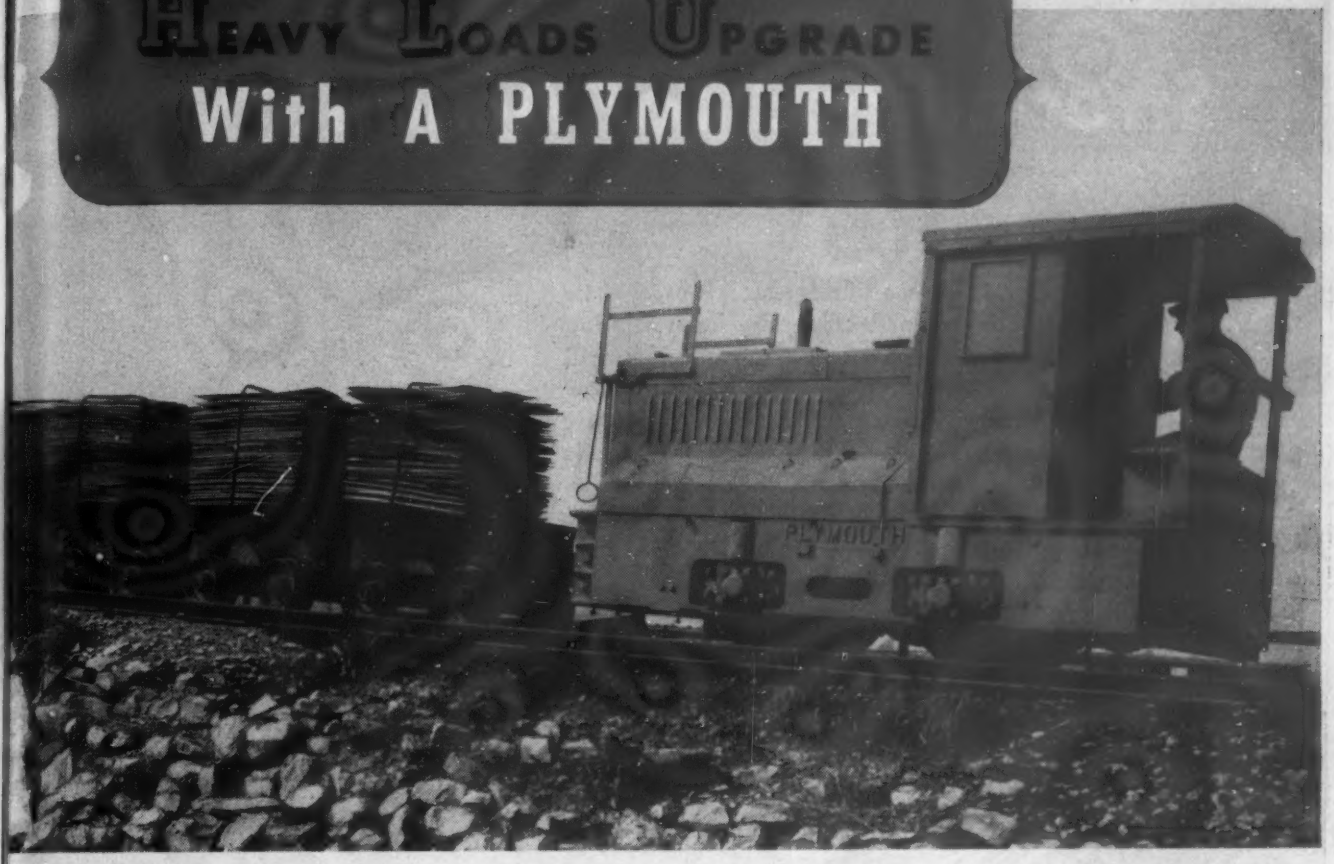
BRASS AND COPPER PIPE

Note: Bridgeport products are supplied in accordance with existing priority regulations.

*Trade name.

BRIDGEPORT ARMY E NAVY **BRASS**

HEAVY LOADS UPGRADE With A PLYMOUTH



Canadian Copper Refiners, Ltd., in Montreal East, Quebec, expect—and get—a full measure of service from their 8-ton Plymouth Gasoline Locomotive. Pushing heavy loads up a steep upgrade is typical of the tasks Plymouth is called upon to perform at this plant. How well it does the job is indicated in the Superintendent's report: "Our Plymouth is doing an excellent job."

There's no secret about the reason for Plymouth's satisfactory, low-cost service on the most difficult industrial transportation jobs. It's the result of carefully engineered design and top quality material and construction that makes a Plymouth capable of more work, in less time, at lower cost.

Plymouth—proved in service—can solve any industrial transportation problem. One of the complete line of Plymouth locomotives—from 2½ to 70 tons—is ready to do a real job for you now. Complete details on any model, gasoline, diesel mechanical or diesel electric, for standard or narrow gauge, are available without obligation. Write today.

TRACK HAULAGE IS CHEAPER HAULAGE

PLYMOUTH LOCOMOTIVES

GASOLINE, DIESEL MECHANICAL AND DIESEL ELECTRIC

PLYMOUTH LOCOMOTIVE WORKS • Division of The Fate-Root-Heath Co., Plymouth, Ohio, U.S.A.

Streamlined for Action!

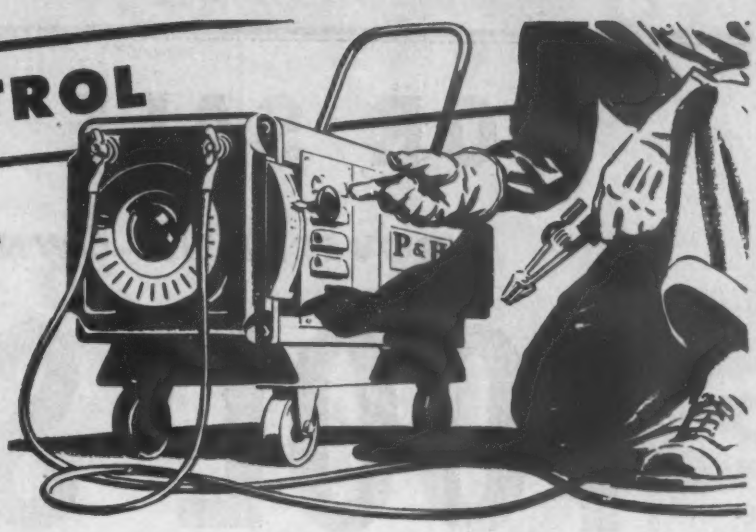
Fire engines of the future, so designers tell us, will be ultra-modern in design and efficiency, incorporating many new features. Aluminum and magnesium will play a vital part in many of the post-war designs now on drawing boards throughout America. Their use eliminates weight—reduces operating costs—and adds greatly to eye and sales appeal. If your product now uses—or can use—these versatile light alloys, the Bohn Engineering staff would like to discuss with you their many outstanding advantages.

BOHN ALUMINUM AND BRASS CORPORATION
GENERAL OFFICES—LAFAYETTE BUILDING • DETROIT 26, MICHIGAN
Designers and Fabricators
ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

BOHN

JUST ONE CONTROL

DOES ALL THESE THINGS . . .



1. **P&H** gives you any desired welding heat within the machine's range.
2. Provides automatic response for all classes of work — downhand, vertical or overhead — with bare or coated electrodes.
3. Assures accurate volt-ampere regulation without corrective devices.
4. Eliminates chances of error in heat settings.
5. Makes welding easier — cuts operator training time.
6. Assures better welding results.
7. Cuts welding costs.
8. Saves time — only one quick setting.

P&H Model WA-200
Arc Welder
30-285 Amperes
Capacity

Yes, for downright simplicity — for easy operation . . . for better welding results . . . for thrifty operation — this P&H machine is in a class by itself! Feature for feature, it's your best buy — for day in, year out faithful service.

WSR (Welding Service Range) ratings which tell the exact amount of *usable* welding current — from minimum to maximum capacity. "Visi-matic" calibration — enables you to select instantly the correct current for each of the three classes of electrodes.

Get all of the facts.
Write for complete information!

Also ask for booklet describing the complete line of P&H Welding Electrodes — including sizes and types for all requirements; fabricating, repair-welding, building up and hard-surfacing.

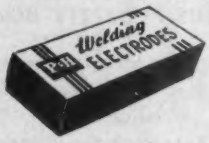
P&H ARC WELDERS
4411 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION
ARC WELDERS • EXCAVATORS • ELECTRIC CRANES (P&H) MOTORS • HOISTS • WELDING ELECTRODES

A COMPLETE ARC WELDING SERVICE • WRITE FOR BULLETIN R7-3

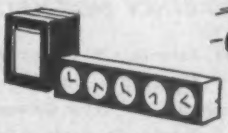
DC WELDERS

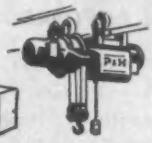
AC WELDERS



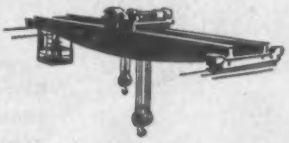
WELDING ELECTRODES

WELDING POSITIONERS


WELDING PRODUCTION CONTROL SYSTEMS



ELECTRIC HOISTS


ELECTRIC CRANES

FOR SALE by RFC

GOVERNMENT-OWNED SURPLUS

TOOL STEEL

In the following grades:

HIGH SPEED **FAST FINISHING** **OIL HARDENING**

CARBON GRADES **DRILL RODS**

Standard Lengths — Standard Brand Names — Priced low enough to be attractive for resale or for use as substitute materials; for economy production of hand tools, implements, etc.

All prices subject to discounts determined by quantities purchased
(F.O.B. Location)

10,000-25,000 lbs. . . . . 25% discount standard mill prices
25,000-40,000 lbs. . . . . 45% discount standard mill prices
40,000-over . . . . . 65% discount standard mill prices
Under 10,000 lbs. . . . . Full mill price (minimum 1,000 lbs.)

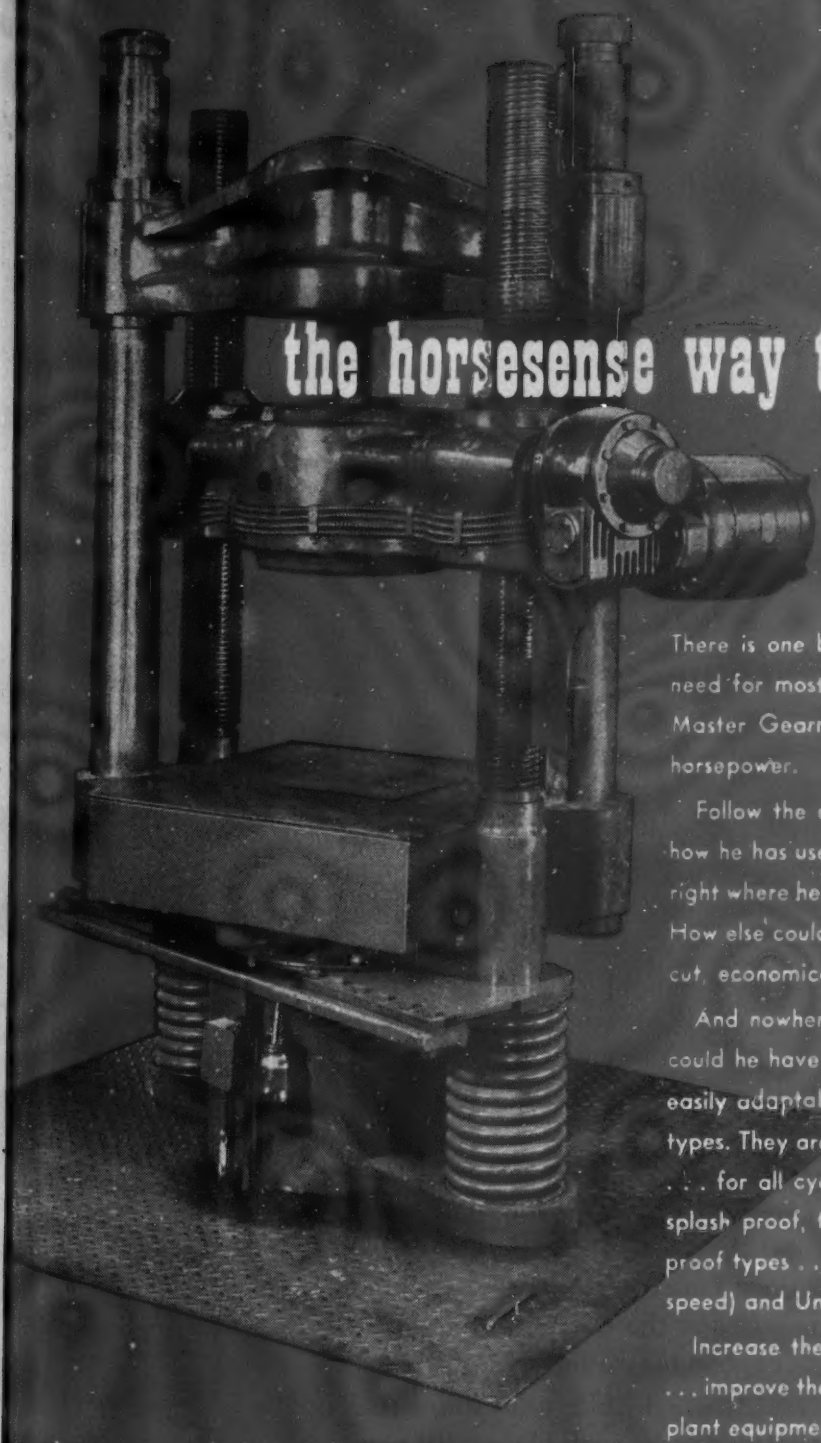
For further and complete information get in touch with the RFC Disposing Agency listed below. The specialized personnel assigned to this office can complete negotiations directly with you—and help in locating your other needs.

o o o

RECONSTRUCTION FINANCE CORPORATION

A DISPOSAL AGENCY DESIGNATED BY THE SURPLUS PROPERTY BOARD

Agencies located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cleveland • Dallas • Denver Detroit • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane



the horsesense way to use horsepower

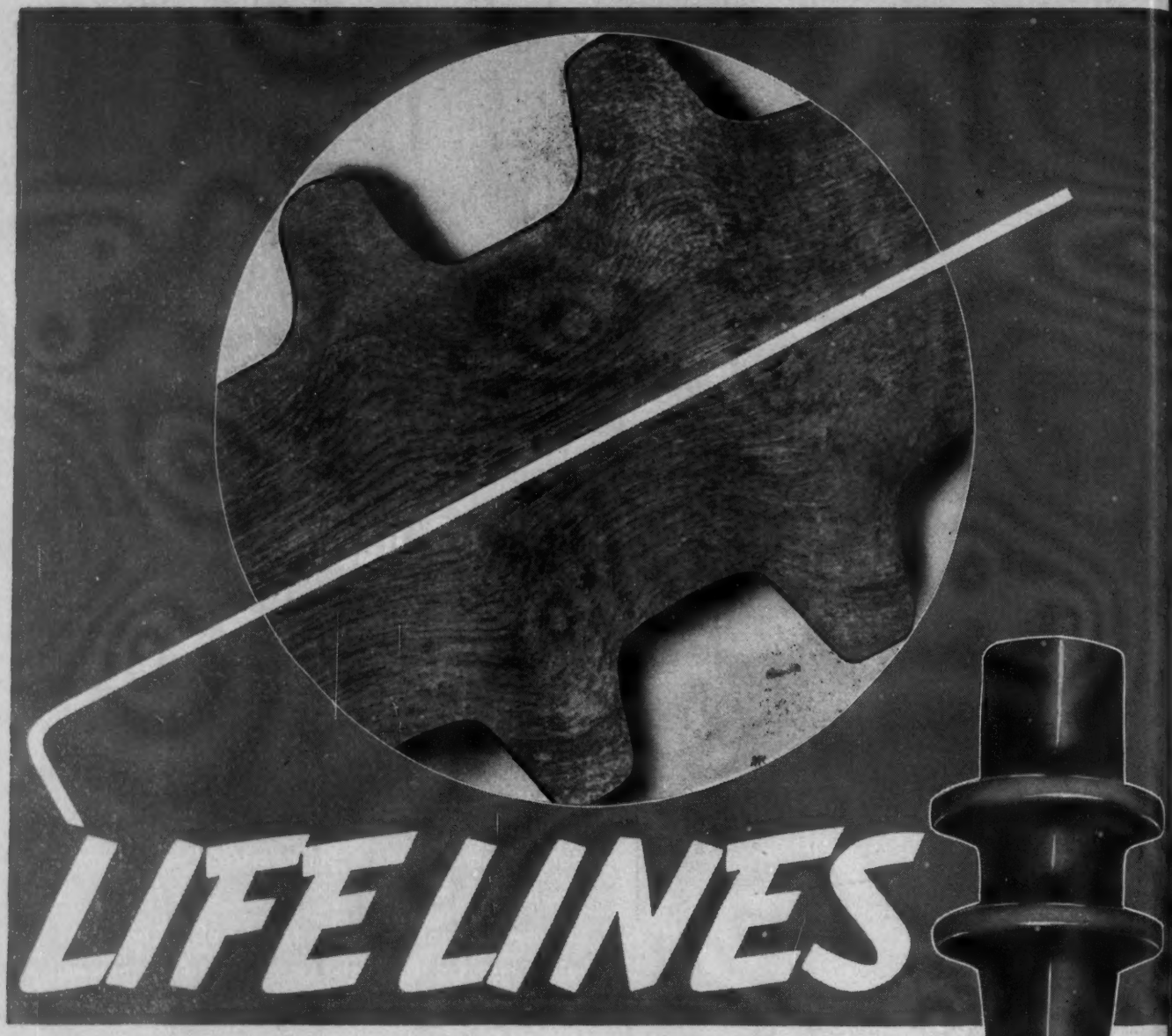
There is one best way to secure the slower speeds you need for most of your motor driven machinery . . . use Master Gearmotors . . . the horsesense way to apply horsepower.

Follow the example of the designer of this press. See how he has used this Master Gearmotor to secure power right where he needs it . . . and at exactly the right speed. How else could he have achieved such a compact, clean-cut, economical design.

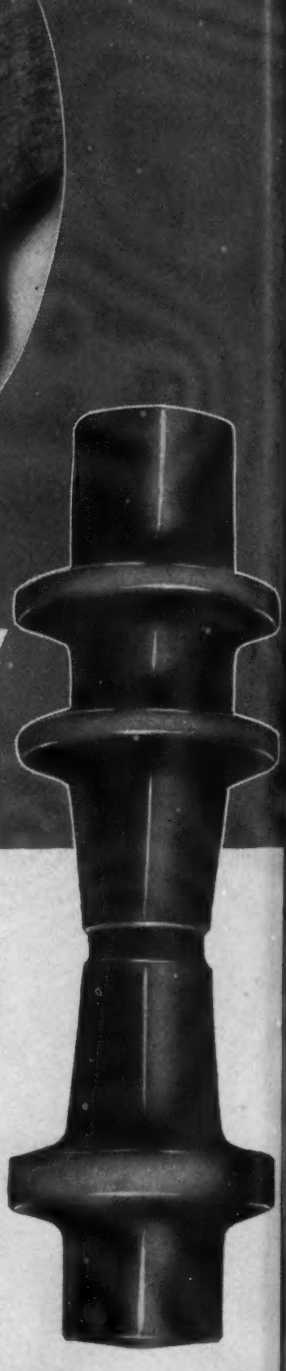
And nowhere, but in the Master line of Gearmotors, could he have found power units that are so flexible, so easily adaptable and in such a wide range of sizes and types. They are available in any size, 100 HP and smaller. . . . for all cycles, phases and frequencies . . . in open, splash proof, totally enclosed, fan cooled and explosion proof types . . . with Speedrangers (mechanical variable speed) and Unibrakes . . . for every type mounting.

Increase the salability of your motor driven products . . . improve the economy, safety and productivity of your plant equipment, with Master Gearmotors . . . the horsesense way to use horsepower.

THE MASTER ELECTRIC COMPANY
DAYTON 1, OHIO



LIFE LINES



THERE ARE several grades of steel commonly used in forgings. Each has its specific characteristics and each will develop its maximum degree of strength and toughness when the drop forging process is correct in every detail, from the scientific design of the die to the final exacting tests of the forging itself.

This photomicrograph of a Forging by Phoenix tells the story. Note how the lines of flow follow the contour of the part and are concentrated at those points receiving the greatest shock and stress. No wonder that Forgings by Phoenix can be depended upon for extra strength, stamina, and long life. Phoenix drop forging brings out the maximum strength and toughness which any specific grade of steel may afford.

In planning your new product, you'll find it worthwhile to consider the use of Forgings by Phoenix. We'll be glad to discuss such plans with you . . . without any obligation on your part.

Forging Division of

PHOENIX MANUFACTURING COMPANY

CATASAUQUA PENNSYLVANIA

Forgings by **PHOENIX**

THE PORTER DIESEL-ELECTRIC LOCOMOTIVE

The H. K. Porter Company, Inc., Pittsburgh, Pa., a leading builder of Diesel-electric industrial and railroad locomotives, gives Westinghouse the responsibility for the design and operation of electrical transmission equipment.

Westinghouse has available all electrical equipment, backed by operating experience, for all standard types and sizes of Diesel-electric locomotives. These locomotives, Westinghouse-equipped, are proving in service their low operating cost, high availability and ability to perform... in accordance with their rating and with minimum maintenance. The Porter all-welded type Diesel-electric locomotive is one of the big reasons why this type of locomotive is enjoying greater popularity and wider application.

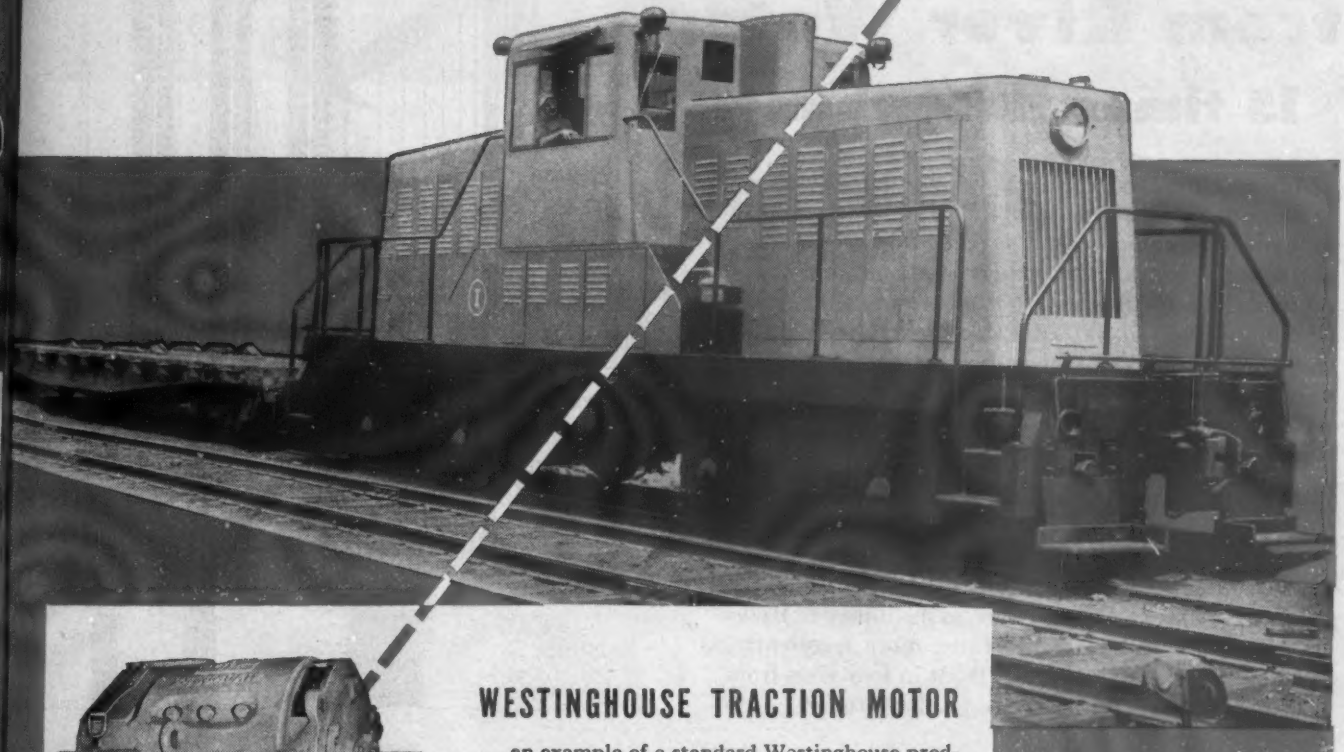
When you need electrical equipment for any form of motive power, take advantage of the half century of Westinghouse electric-drive experience.

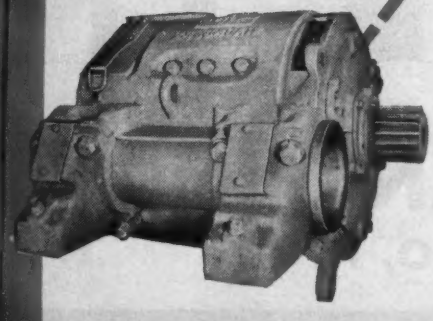
J-15108

...another example of

WESTINGHOUSE ELECTRICAL PROPULSION

Designed to Locomotive Builders Requirements





WESTINGHOUSE TRACTION MOTOR

...an example of a standard Westinghouse product designed to the needs of machinery builders ...the result of "co-ordinated engineering". Specifications: series-wound motor, spring-suspended, high-speed, lightweight, single-reduction gearing, Class "B" insulation.

Westinghouse PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Diesel-Electric Drives

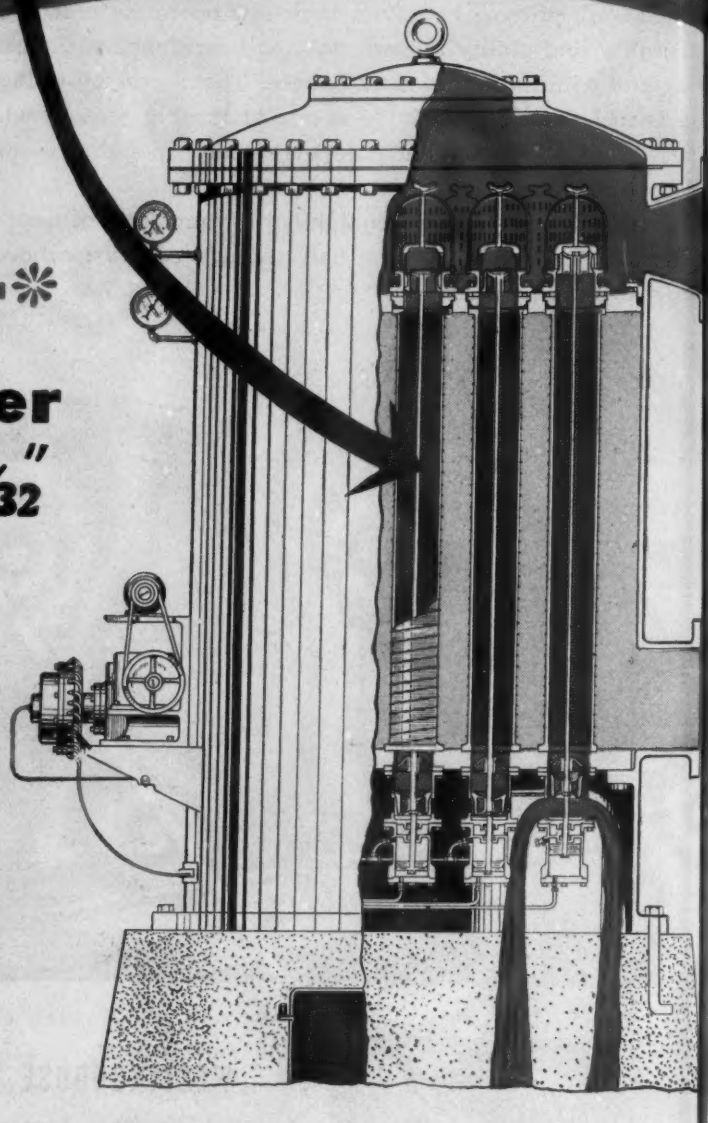
ADAMS AUTOMATIC WATER FILTERS

Remove GRIT and DIRT* from River Water

*15 times finer than 1/32"

Adams *Poro-Screen* Filters offer a practical answer to large-scale filtration of dirty river water for use in hydraulic equipment. Designed for continuous, automatic operation and requiring a minimum of attention, Adams Automatic Filters supply the required volume of clean water for your operations—water free of dirt and grit which damage bearings, rolls, valves and other equipment. Highly successful on water cooling installations of open-hearth and heat-treating furnaces.

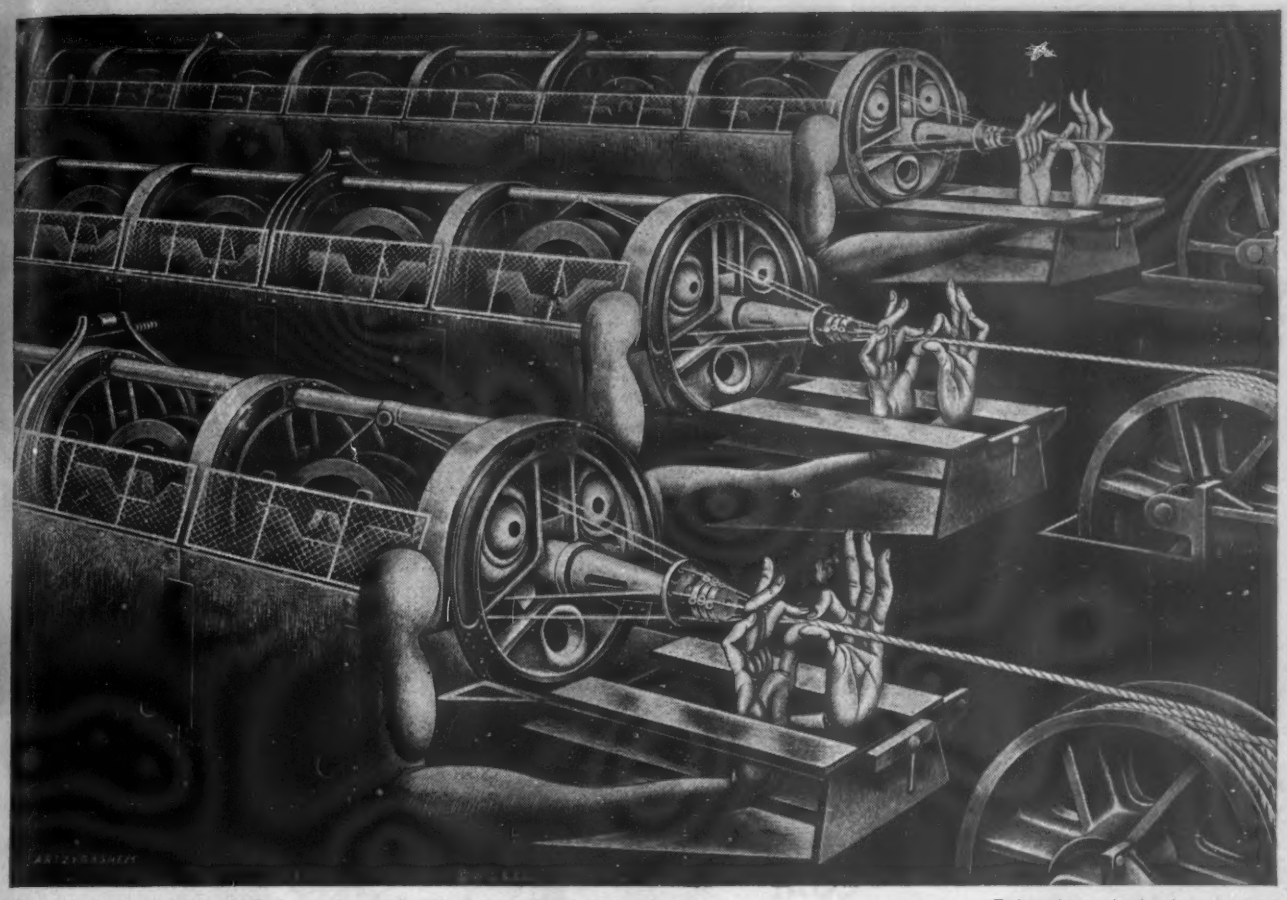
Adams Automatic Filters provide low velocity filtration. Their multiple tube design has no moving clearances, is fully automatic. One tube is back washed at a time while filter is delivering full rated capacity. Adjustable control gives flexibility of back-washing—excessively dirty water more frequently, normal water less frequently. Built in four sizes from 300 gpm. to 2000 gpm. Write for Bulletin 901.



★ R. P. ADAMS COMPANY, INC. ★

75 CHICAGO STREET, BUFFALO, N. Y.

ADAMS PORO-STONE AND PORO SCREEN FILTERS



Ninth of a series of Artzybasheff's impressions of the manufacture of steel wire products

Enlarged reproduction free on request

ROPE ROBOTS REQUIRE TOUGH WIRE

Spinning six strand, steel-sinewed wire rope at high speed . . . the job of a closing machine . . . calls for tough, skillfully prepared rope wire.

The steel for Wickwire Spencer rope wire is made in our own open hearth furnaces. This type of refining furnace removes all but absolute minimum quantities of harmful phosphorus and sulphur. It likewise permits blending of proper proportions of carbon and manganese to produce rope wire that meets exacting specifications.

As a further assurance of high, uniform quality, only the sound "heart" of the steel ingot is used for rope wire. Careful rolling, drawing and processing result in wire with the highest possible degree of hardness, strength, toughness and fatigue-resisting qualities.

The same careful control and skilled craftsmanship is used in producing *all* Wickwire Spencer wire. For, as makers and workers of wire, we know that it must be uniform in size, tensile and stiffness. Then it's easier on wire working machines and customers are satisfied.

If you want steel wire of any size, temper, analysis or finish; round, flat or shaped; send your order or inquiry to Wickwire Spencer. We'd like to add your name to our long list of satisfied customers.

Send your wire questions to

WICKWIRE SPENCER STEEL COMPANY

EXECUTIVE OFFICES—500 FIFTH AVENUE, NEW YORK 18, N. Y.

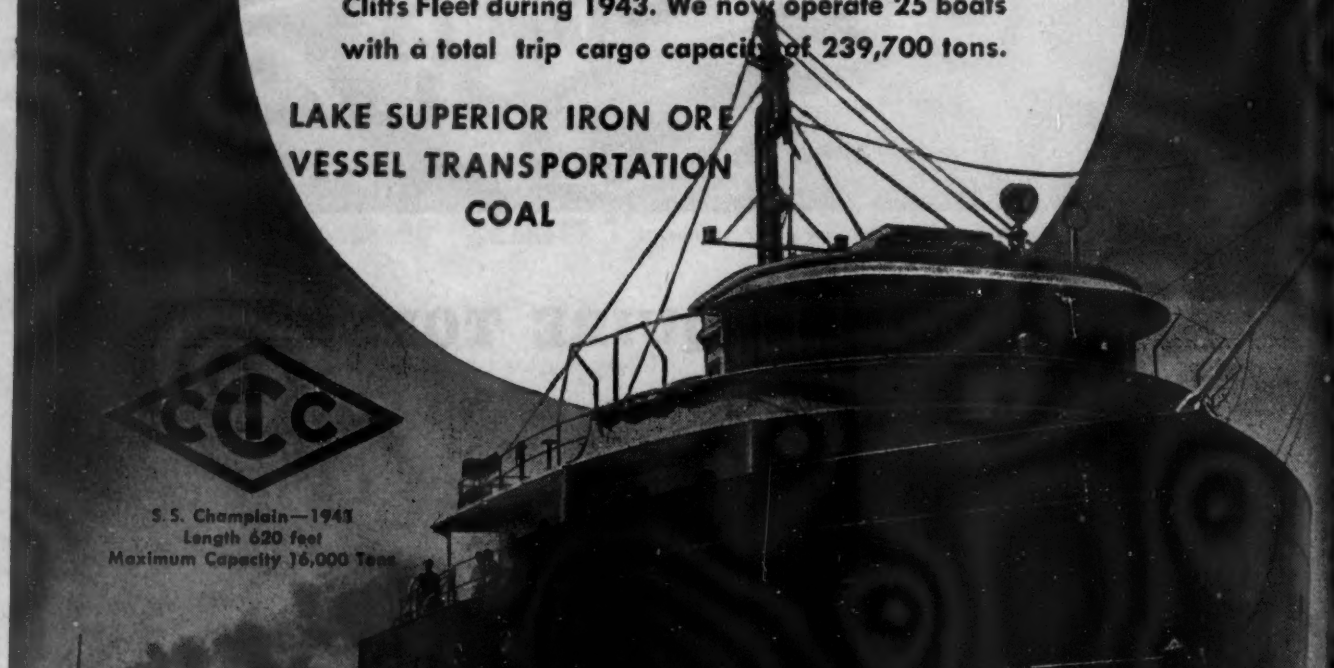
Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Clinton (Mass.) • Detroit • Houston • Los Angeles • Philadelphia • San Francisco • Tulsa • Worcester

Designed TO CARRY

THE COMMERCE OF THE GREAT LAKES *IN WAR AND IN PEACE*

Two great vessels were added to the Cleveland-Cliffs Fleet during 1943. We now operate 25 boats with a total trip cargo capacity of 239,700 tons.

LAKE SUPERIOR IRON ORE
VESSEL TRANSPORTATION
COAL



The Cleveland-Cliffs Iron Company

UNION COMMERCE BUILDING • CLEVELAND 14, OHIO

WHEN YOU

CALL SALEM

STEP 3

ABORATORY EXPERTS GO INTO ACTION

Here's how Salem Service includes laboratory ex-rts who collaborate with our heating engineers in veloping new heating ideas to meet your peace oduction. Many heating innovations have been ginated during the war. Salem can incorporate se cost-cutting ideas into your new heating fur-ces and allied equipment.

When you "Call Salem," a Salem engineer dis-sses production needs with you. He returns to em and puts visual experts to work. Next, useful oduction information on costs plus "roughs" are omitted. After you have given us the o. k., working eprints are prepared. Construction gets under y and in a reasonable time you have the most cient heating equipment you can buy.

CALL SALEM about your heating furnace or allied ating equipment. Salem originated "Engineered eat" and built the world's largest rotary forge rnace.

NOTE: Write for Salem's new 20-page, illustrated booklet—"Engineered Heat," complete with easy-to-use heating and temperature charts.

New ideas, tempered with thorough planning, seasoned with experienced workmanship, give you the type of heating furnace and equipment you want for low-cost, profitable operation. CALL SALEM for any type, size, or style of heating furnace or allied heating equipment.

SALEM

ENGINEERING COMPANY

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SALEM ENGINEERING COMPANY

Engineered Heat

PENFLEXWELD

CORRUGATED FLEXIBLE ALL-METAL TUBING

for SAFE conveying of your air, oil, steam, gases and volatiles at

High Pressures

PENFLEXIBLE steam line on laundry mangle

PENFLEXWELD is a one-piece, one-material jointless flexible Tubing. Its corrugated construction expands and contracts with temperature alternations . . . provides flexibility and develops high resistance to bursting, cracking and crushing. Finished outside and inside diameters are equidistant from the mid-thickness line of the plain tube wall, providing you with a uniform wall finish that resists fatigue, pressure and prevents seepage.

PENFLEXWELD is a high-pressure Tubing. Standard Braided and Protective Sleeve Types have bursting pressure range from 12,500 psi in 5/32" I.D. to 1,150 psi in 2" I.D. Pressure range may be increased with special braids.

PENFLEX COUPLINGS for PENFLEXWELD TUBING.

SOLSEAL—for general use—designed for service where temperatures do not exceed 250 degrees F.

METSEAL—for high temperatures—a positive metal-to-metal joint. No packing used, metal must break or melt before joint separates.

PENFLEXWELD TUBING and COUPLINGS are described in Bulletin 90 C. Write for it.

PENFLEX METAL HOSE

PENFLEX

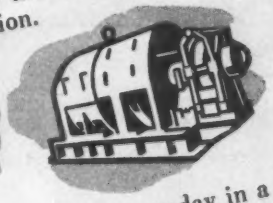
PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.

7219 POWERS LANE Established 1902 **PHILADELPHIA 42, PA.**

To executives responsible for rapid reconversion to peacetime production

SHORTENED DELIVERIES OF D-C MOTORS AND M/G SETS NOW IN VIEW

Crocker Wheeler's reconversion is completed. We had no great problem. The special items built for war use, such as trench mortar bombs, .30-caliber airplane training turrets and Sherman tank turrets, were completed long ago and the Company's basic products — electric motors and generators — are essentially the same for peacetime application.



This means that we are today in a better position to produce electrical equipment for the steel industry than we have been at any time during the last five years. In fact, we can promise "better-than-pre-war" deliveries on large equipment, as supplies of raw materials become more abundant.

For the last fifty years a large portion of our plant capacity has been devoted each year to the manufacture of equipment for the steel industry. This equipment has included: Direct-current motors in sizes up to 5,000 hp for main roll drives and for operating slab squeezers, trimming shears, levelers, etc.; motor-generator sets to supply power for main motors, auxiliaries, cranes and hoists; and standardized mill motors for auxiliary drives and heavy-duty crane applications.

We continued to serve the industry to the best of our ability through the war years. Now, with fewer factors "beyond our control", we can serve you *faster*. If you need electrical equipment for rapid reconversion, call on us. Our facilities are at your service.

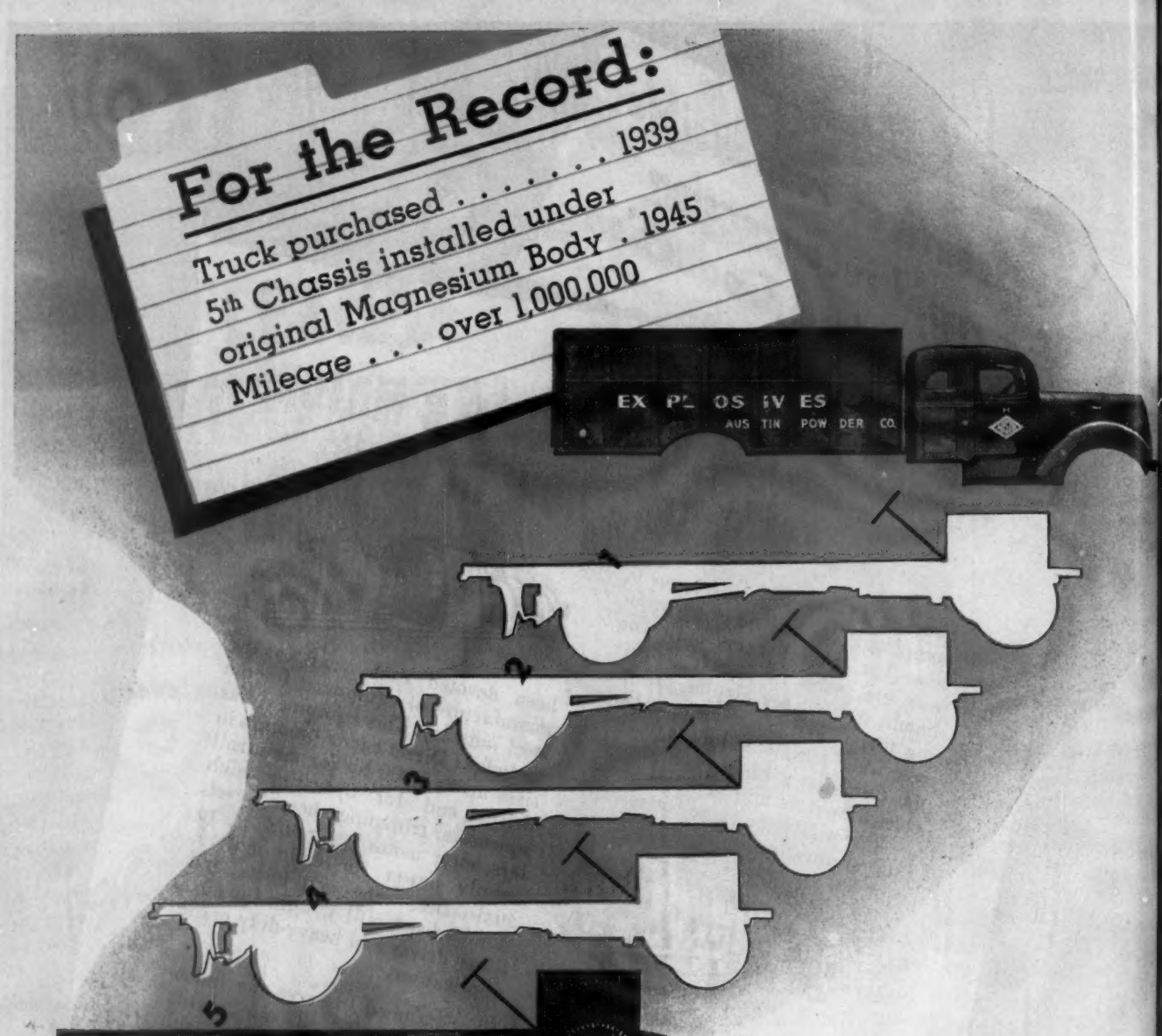
E W Amy

General Manager

CROCKER-WHEELER DIVISION • JOSHUA HENDY IRON WORKS

Ampere 33, New Jersey

CW-10


For the Record:
Truck purchased 1939
5th Chassis installed under
original Magnesium Body . 1945
Mileage . . . over 1,000,000
EX PL OS IV ES
AUS TIN POW DER CO.

So reads the record of the Austin Powder Company on Truck 3-c.

The structural members and floor assembly of magnesium sheet and extrusions took this grueling million miles and more, and are in excellent condition today.

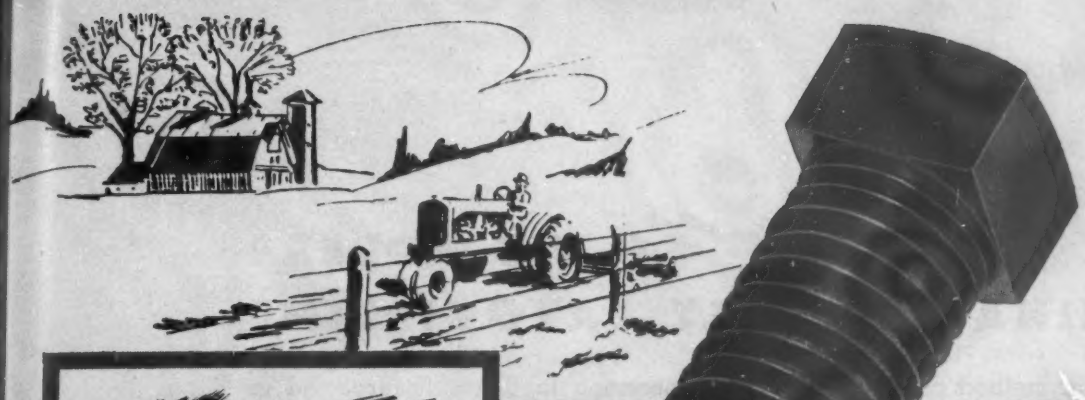
Mazlo Magnesium alloys have the strength and durability that build strong and lasting bodies . . . and the lightness that makes them pay dividends in added payloads, and lower maintenance costs.

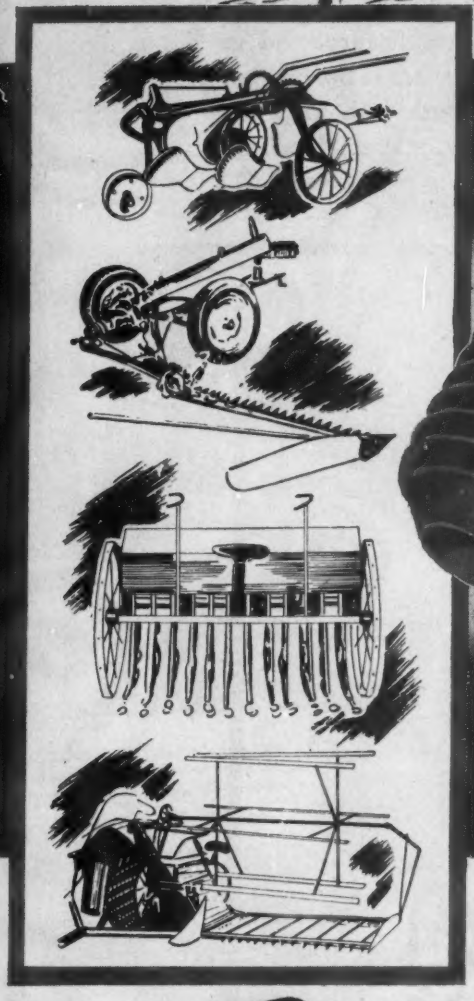
Our engineers will gladly help you and your bodybuilder employ magnesium to best advantage. Write Aluminum Company of America, Sales Agent for American Magnesium Products, 1721 Gulf Bldg., Pittsburgh 19, Pa.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA





SET Screws by FERRY CAP

TO hold parts rigidly in place—and to provide for quick, easy adjustment—makers of farm equipment and other machinery manufacturers specify "Ferry Cap Set Screws."

These set screws are case hardened—the hard point *bites in* and *holds.* They fit perfectly and respond readily to adjustment needs.

"Ferry Cap Set Screws" are expertly made by the first company to produce Cup Point Set Screws by the cold upset process of manufacture. They embody the skill and experience gained in 38 years of precision manufacturing.

Square head and headless—cup and oval point—case hardened—sizes ¼" diameter and larger. Carried in stock for immediate shipment.

The FERRY CAP & SET SCREW Co.

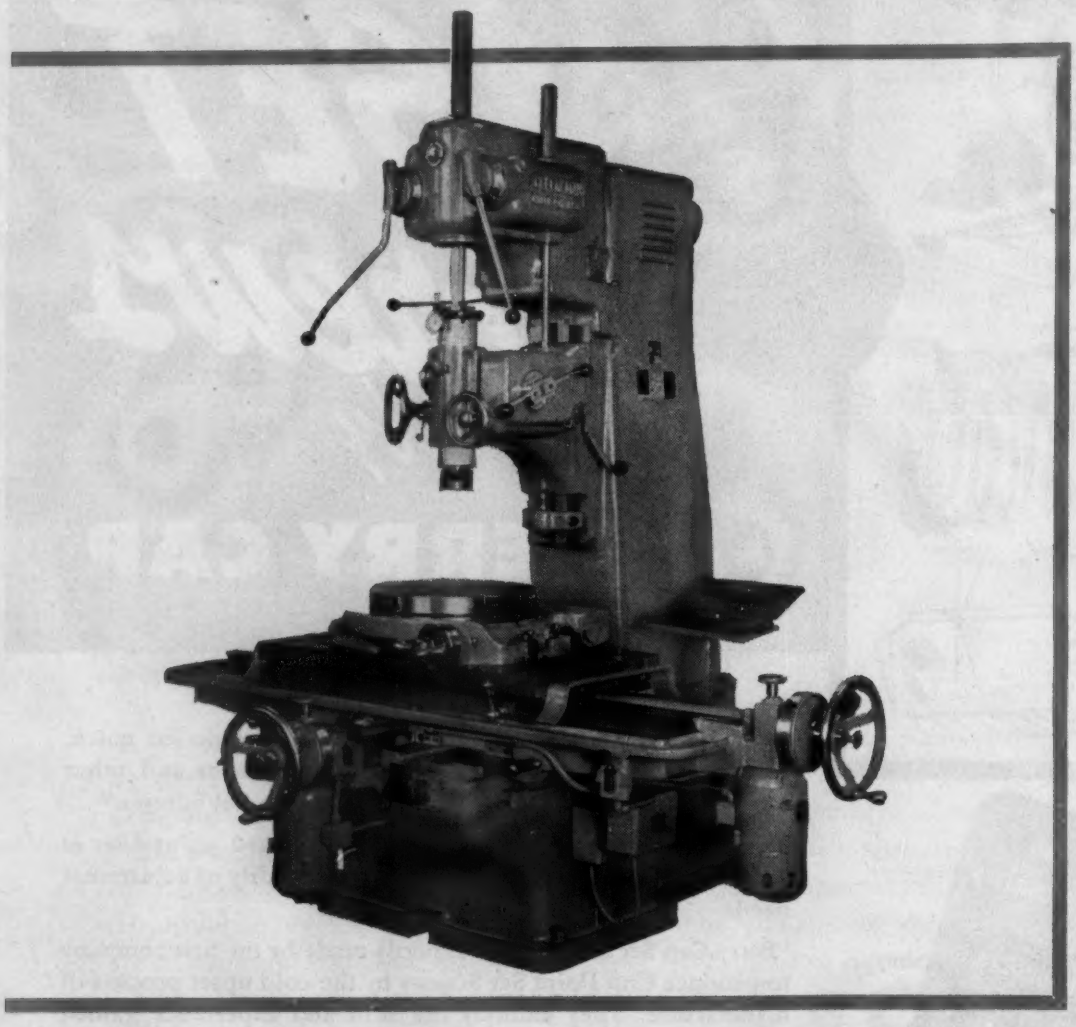
2159 SCRANTON ROAD — CLEVELAND 13, OHIO

EXPORT MANAGER: ERNEST W. LENZ, 280 BROADWAY, NEW YORK 7, N. Y.

CAP AND SET SCREWS • CONNECTING ROD BOLTS • MAIN BEARING BOLTS • SPRING BOLTS AND SHACKLE BOLTS • HARDENED AND GROUND BOLTS • SPECIAL ALLOY STEEL SCREWS • VALVE TAPPET ADJUSTING SCREWS • AIRCRAFT ENGINE STUDS • ALLOY STEEL AND COMMERCIAL STUDS • FERRY PATENTED ACORN NUTS

Cleereman JIG BORERS
ELIMINATE COSTLY LAYOUT TIME

No other machine or method can surpass the speed and accuracy of the Cleereman Jig Borer for locating and boring holes in jigs, fixtures, dies and gauges. Not only is the Cleereman Jig Borer unsurpassed in the tool room but it is efficient in performing small lot production work without previous layout, jigs, fixtures, or special tooling.



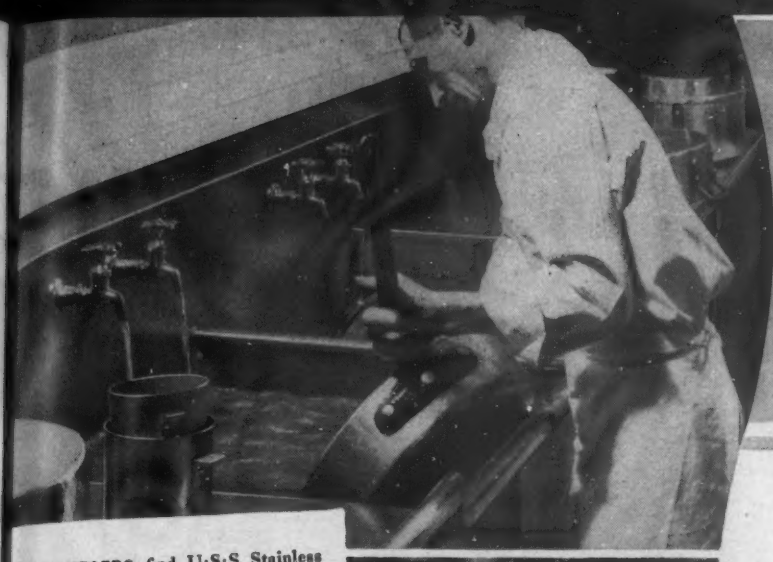
Cleereman Machine Tool Co. also builds Box and Round Column Sliding Head Drilling Machines. Write for catalogs today!

Address

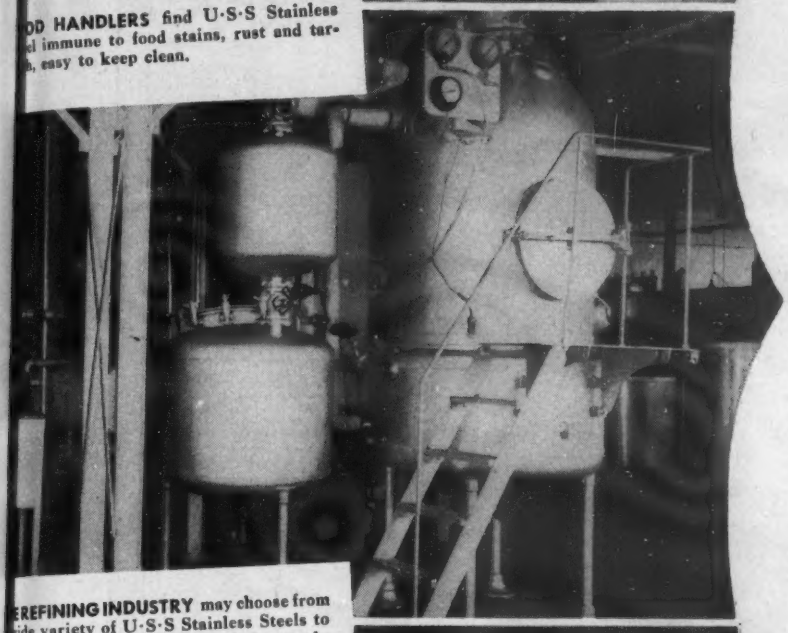
BRYANT Machinery & Engineering Company

General Offices
400 West Madison Street
Chicago 6, Illinois

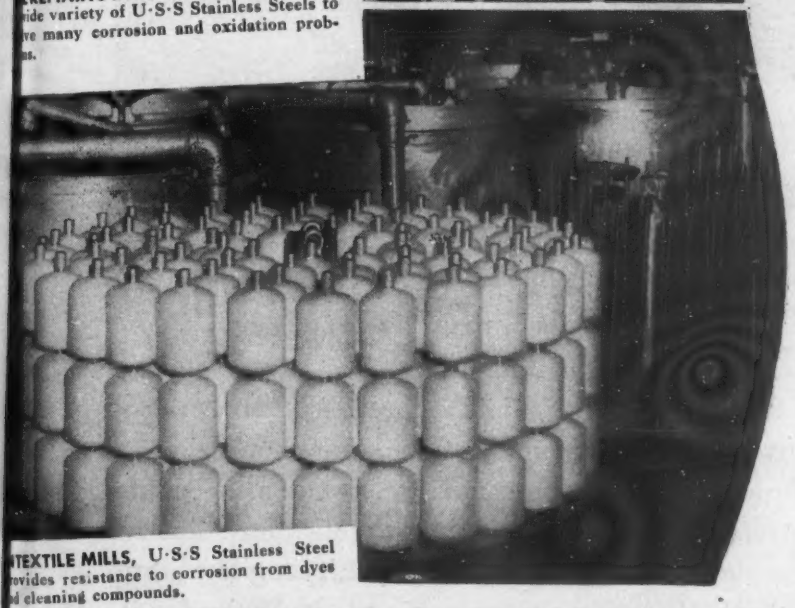
Associated with
CLEEREMAN MACHINE TOOL CO.



OD HANDLERS find U·S·S Stainless el immune to food stains, rust and tar- h, easy to keep clean.



EFINING INDUSTRY may choose from ide variety of U·S·S Stainless Steels to ve many corrosion and oxidation prob- ns.



TEXTILE MILLS, U·S·S Stainless Steel ovides resistance to corrosion from dyes d cleaning compounds.

LARGE STOCKS OF *Stainless Steel* AVAILABLE FOR IMMEDIATE SHIPMENT..

Call Us!

CUTBACKS in military demands have permitted us to build up our warehouse stocks of U·S·S Stainless Steel. Sheets, plates, rounds, bars of all kinds, pipe, tubing, angles and welding electrodes in all standard grades and specifications are available for quick delivery.

OUR ENGINEERS WILL HELP YOU!

War production has taught us hundreds of new ways to use Stainless Steel. This increased knowledge is at your service. Our engineers will gladly assist you in selecting the proper types of U·S·S Stainless Steel for your requirements and will help you with fabricating problems. Free technical bulletins will be sent to you upon request.

PHONE, WRITE OR WIRE our nearest warehouse when you need Stainless Steel. A call to us may help you solve a production problem, may speed reconversion to peacetime operations. We are doing our best, under today's conditions, to maintain our reputation for quick service. Your orders and inquiries will receive courteous attention and prompt action.

UNITED STATES STEEL SUPPLY COMPANY
USS STEELS
SERVICE

UNITED STATES STEEL SUPPLY COMPANY

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UNITED STATES STEEL

AT LAST—IRON and STEEL MILL LUBRICATION *Simplified*

THE SERVICE FACTOR
Lubrication of Iron and Steel Mill Machinery
LUBRICATION OF IRON AND STEEL MILL MACHINERY
AL LUBRICATION CHART

Sinclair Offers This Guide To Complete Efficient Lubrication Of All Types Of Equipment

For the first time in the industry's history, the problems of iron and steel mills have been studied to produce a simple charting that makes for elimination of confusion and errors in plant lubrication. This new original Sinclair chart makes it a simple matter to select proper lubricants for all types of machinery. The advantages are simplification, reduced lubricant inventory, economy, avoidance of mistakes in application, and extension of machine life through use of correct lubricants. Sinclair will furnish promptly this complete lubrication guide upon request. Write for it.

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Thank you, Customers,

you've brought us a long way!

From ten employees to three hundred . . . from a shed to a great modern plant—that's how we have grown since our beginning in 1919. And we've grown because you, in increasing numbers, have steadily increased your demands for our products.

We have one means to show our appreciation—our assurance that we shall not only maintain, but strive to improve wherever possible, the quality of Raco products that has warranted your giving us your business.

REID-AVERY COMPANY

INCORPORATED

DUNDALK • BALTIMORE 22 • MARYLAND

SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

VITREOUS ENAMELING

simplified in production and *reduced* in cost by this

new Titanium Steel

ADVANTAGES

THE use of Titanium steel offers the listed advantages to the Vitreous Enamel Industry. These advantages have been proved in laboratory and plant operation where the recommended practice covering nickel flashing, pickling and enameling has been followed:

1. Elimination of enamel boiling due to steel defects.
2. Elimination of conventional ground coat.
3. Elimination of copper heading.
4. Improved sag resistance.
5. Improved resistance to warping.
6. Excellent deep drawing qualities.
7. Use of conventional cover coats directly on metal.
8. Resistance to hydrogen penetration or absorption.

The benefits you derive from these advantages are: Lighter enamel weights and coats... reduction of chippage and mechanical breakage losses... increase in production efficiency through reduction of rework and re-operation... sharply improved thermal shock resistance of white enamel, due to thinner enamel thickness... overall cost reduction for enameled ware... increase in production speed. Even when a ground coat is used this NEW Titanium Steel for Vitreous Enameling brings important manufacturing cost reductions.

Manufacturers of both steel and enameled products may obtain complete factual technical data from a member of our Technical Staff, or by mail. Consult your steel supplier on deliveries.

Pending patent applications on the new enameling process and product made thereby are owned jointly by Inland Steel Company and The Titanium Alloy Manufacturing Company under Trust Agreement.

THE TITANIUM ALLOY MANUFACTURING COMPANY

Executive Offices: 111 BROADWAY, NEW YORK, N. Y. *General Offices and Works:* NIAGARA FALLS, N. Y.

FORGING . . . cuts weight 25 to 42%

. . . INCREASES STRENGTH . . . WIDENS SAFETY MARGIN

DEMONSTRATING again the improvement of metal by forging, this 3,000 lb., Erie Steam Hammer completes the journal and wheel seats on an average of 1,000 tubular railway car axles daily. The weight reduction of 25.1 to 42.8% is thus obtained along with a wide margin of safety because closed impression die forging kneads the metal into a dense mass of flawless strength, resulting in greater wear resistance and more resilience.

Here again, the directioning of the metal fibre structure by forging produces necessary qualities in these tubular railway axles to meet the stresses and strains of constant service . . . to protect from accident, the freight and passenger cargoes entrusted to railroad transportation.

Thousands of Erie Hammers now in service turn again to the improvement of metal for peacetime pursuits . . . sturdy, dependable producers of industrial forgings.

It will pay you to consult with Erie Foundry Engineers on your forging problems.

ARMY E NAVY

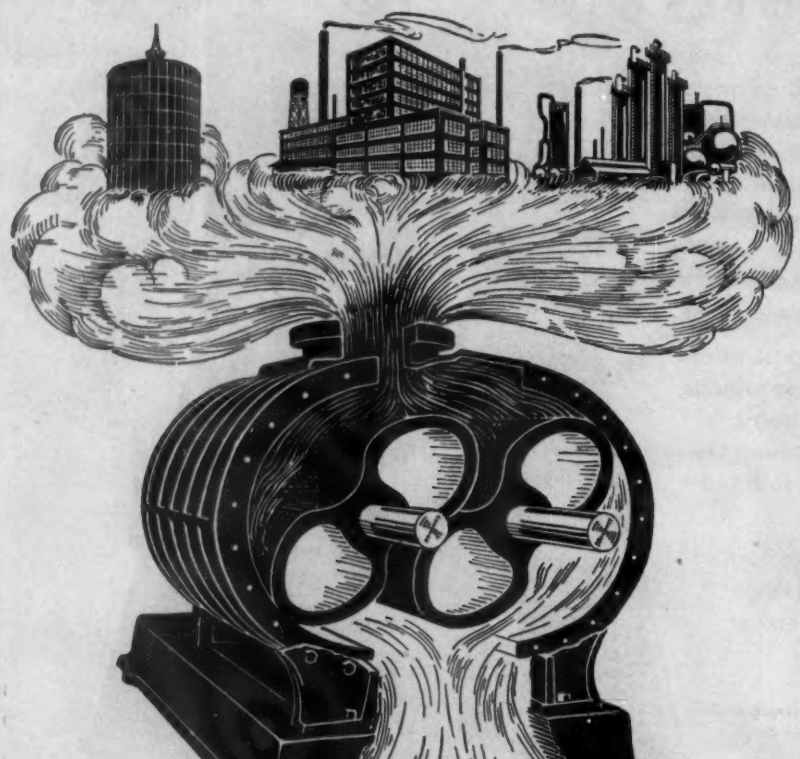
ERIE

ERIE FOUNDRY COMPANY

ERIE, PENNSYLVANIA

ERIE BUILDS *Dependable* HAMMERS

Couple of dumbbells do a smart job of pushing



Those two dumbbell-shaped objects in the blower casing give industry a tremendous push.

To the technically minded, they're impellers. They push air or gas (any kind—natural, manufactured, inert or corrosive) through the blower in precisely measured amounts at precisely maintained pressure. Thousands of things you take for granted, from plastics to planes, from matches to mops, depend for their manufacture on a controlled supply of gases.

But a gas is an elusive thing to push around, especially when you have to know exactly how much you're pushing.

The impellers in a Roots-Connersville Blower are so designed that they revolve within a gnat's whisker of each other but never touch. No lubricant contaminates the gases. No internal, mechanical friction causes wear or heat.

So simple, so efficient, so adaptable is this piece of engineering that Roots-Connersville Blowers are by far the most widely used blowers of this type in the world.

As problems of moving gases have multiplied and varied, Roots-Connersville has engineered centrifugal blowers as a companion line to serve where centrifugal characteristics achieve better results. Moving air and gases by whatever means is most efficient, under pressure or vacuum, is Roots-Connersville's job in the forward course of industry.

This work is typical of the distinguishing characteristic to think of in connection with all members of Dresser Industries, Inc.—Creative Engineering. pioneering in the service of industry.

Roots CONNERSVILLE + DRESSER INDUSTRIES

THE PLUS OF DRESSER INDUSTRIES

Back of every product of every member of the group of companies stands Dresser Industries, Inc.—strengthening the resources; co-ordinating and stimulating engineering, production and distribution for its member companies. This is the Plus of Dresser Industries. To customers of every Dresser member this Plus is passed on through the products they buy—a Plus Value.

Dresser Industries, Inc., Terminal Tower
Cleveland 13, Ohio

BOVAIRD & SEYFANG Manufacturing Co.
Bradford, Pa.

BRYANT Heater Company, Cleveland, Ohio

CLARK Bros. Co., Inc., Olean, New York

DAY & NIGHT Mfg. Co., Monrovia, Calif.

DRESSER Manufacturing Div., Bradford, Pa.

DRESSER Manufacturing Company, Limited
Toronto, Ont., Canada

INTERNATIONAL Derrick & Equipment Co.,
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Beaumont, Texas, Torrance, Calif.

VAN DER HORST Corporation of America,
Olean, N. Y. and Cleveland, Ohio

STACEY BROS. Gas Construction Company,
Cincinnati, Ohio

ROOTS-CONNERSVILLE Blower Corporation,
Connersville, Ind.

PAYNE Furnace Co., Beverly Hills, Calif.

PACIFIC Pumps, Inc., Huntington Park, Calif.

KOBE, Inc., Huntington Park, California

Industry Endorses EUTECTIC Low Temperature WELDING RODS* and FLUXES

"THE MOST REMARKABLE DEVELOPMENT† SINCE THE INVENTION OF THE WELDING TORCH!"

Robert F. Miller - President of Pottstown Mfg. Co., Pottstown, Pa.

MANUFACTURER OF MACHINE PARTS AND ASSEMBLIES, INCLUDING TUBE BENDING AND WELDED SECTIONS

"We fabricated these aircraft ordnance parts with EutecRods 16 for steel (1300-1600°F.), No. 1800 for ferrous and non-ferrous metals (940-1120°F.), No. 190 for aluminum and alloys (950-1060°F.) and No. 1601 for alloy steel (1020-1250°F.). The use of these Low Temperature Welding Rods reduced our production costs materially. As many as 4000 pieces were produced with a No. 16 rod, and inexperienced girls were expertly welding tough and delicate parts after only a few hours of instruction from our welding specialist George Bauer. Because EUTECTIC Low Temperature Welding Rods can be applied with ease, we maintained a greater operating efficiency among our plant personnel."

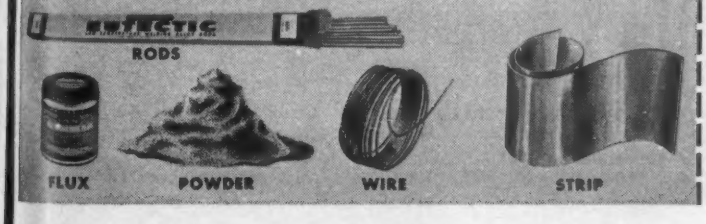
INVESTIGATE EUTECTIC TODAY

In production, EUTECTIC Low Temperature Welding Rods* play a vital role. Because they can be successfully applied by beginners—because they can be used with extremely low heat and produce welds that are more machinable, show less stress and distortion and exhibit consistently high strength—EutecRods and EutecTrodes are a growing factor in major civilian production work and are *rapidly displacing fusion welding and brazing.*

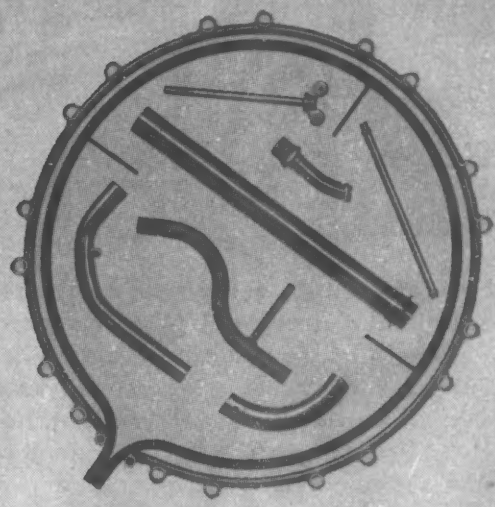
All EUTECTIC Alloys are now available for civilian production. By means of 48 specially developed Rods and Fluxes you can employ the many revolutionary advantages of EUTECTIC *Low Temperature* Welding. Get the facts today! Call in your local EUTECTIC Field Engineer and learn how EUTECTIC can be made to serve you.

Write for Eutectic's Civilian Production Folder EW-20 Today!

Castolin Eutectic



*Trade Mark Reg. U. S. Pat. Off.



†WHAT IS EUTECTIC?

EUTECTIC Low Temperature Welding Rods are a new type of welding alloys, which—

- **Bond to base metals well below the base metal melting point**
- **Avoid the dangers of stress and distortion characteristic of fusion welding**
- **Form exceedingly strong bonds through surface alloying**

EUTECTIC WELDING ALLOYS COMPANY

ORIGINATORS OF EUTECTIC LOW TEMPERATURE WELDING

40 Worth Street New York 13, N. Y.

Please send me complete facts about EUTECTIC Rods and Fluxes and information on how to purchase a selection of the 9 most important EutecRods for every day use. Dept. GN1

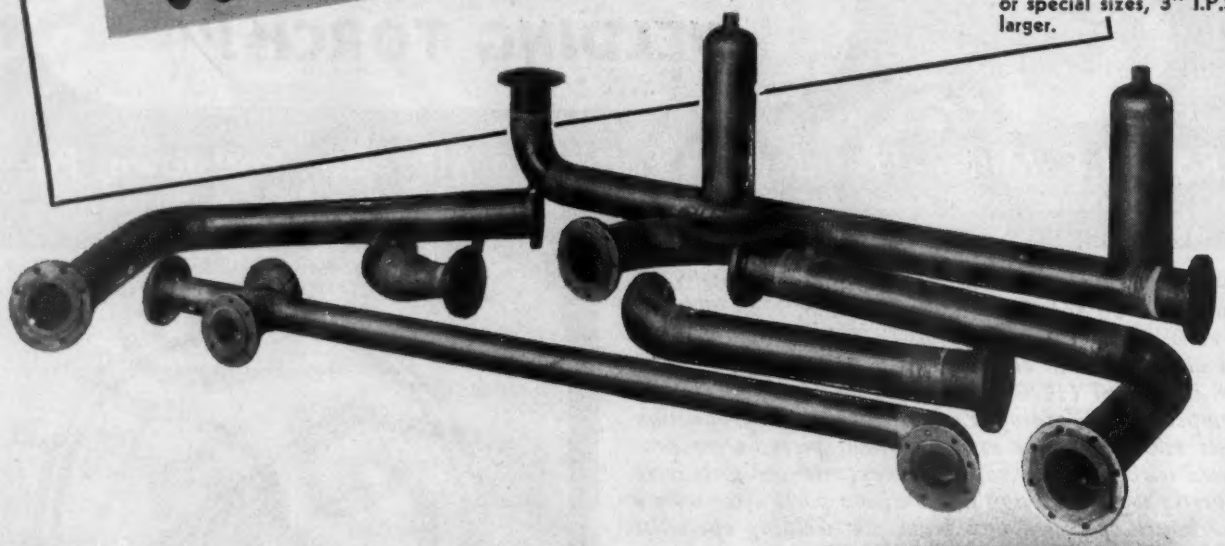
Name.....

Company.....

Address.....

WHY WELDCO ENGINEERS CAN HELP YOU WITH YOUR CORROSION PROBLEMS

Specialists in fabricating equipment from alloys . . . Welded tubing and fittings in standard or special sizes, 3" I.P.S. and larger.

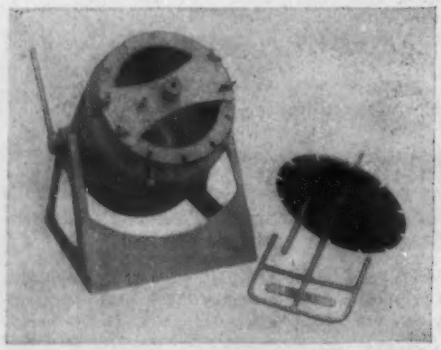


If you are using steel now and you are having corrosion and maintenance problems, consider the use of alloys. The Youngstown Welding & Engineering Company engineers have solved many problems during the past 35 years . . . they have increased production and reduced maintenance costs . . . they have added product life to much equipment. Whatever may be your needs for alloy parts or equipment — large or small . . . in quantity or one custom made piece — Weldco facilities are ample. Write today.

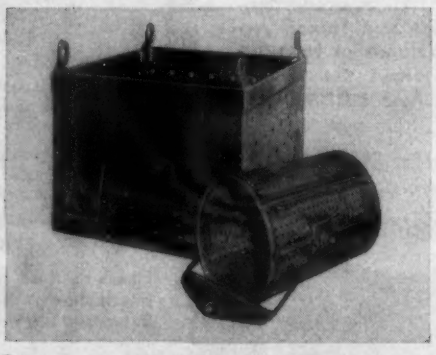
THE YOUNGSTOWN WELDING & ENGINEERING COMPANY

3711 OAKWOOD AVE YOUNGSTOWN 9, OHIO

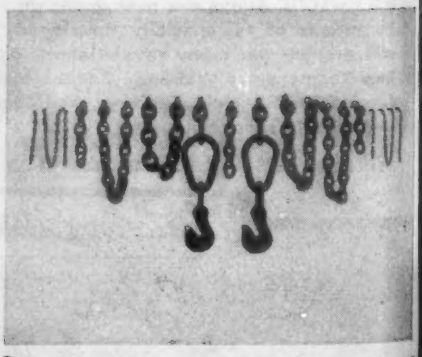
ARMY (E) NAVY



● The laboratory reaction kettle, designed and built by us, is an example of Weldco ability to make equipment large or small to customer requirements.



● Corrosion resisting processing equipment, tanks, kettles, agitators, and miscellaneous pickling equipment fabricated from alloys . . . custom made. Engineering department will furnish designs.



● Weldco chain and accessories, made of corrosion resisting metals. Have been used on tough jobs for years, save costs, increase safety. Standard or special. Literature available.

BLAW-KNOX No. 735-02. *A Heavy Duty, Two-Line, Hook-on type Bucket, for open hearth service. Rated capacity — 3 cu. yd.*

Open Hearth Slag used to be a "Bucket Killer"

But not now . . . Over a period of years, and with the helpful cooperation of open hearth superintendents, Blaw-Knox has developed a line of buckets fully able to cope with this punishing service.

Improved design, generous use of alloy steels, rugged construction and important safety features have put Blaw-Knox Buckets out in front wherever steel is made. To select exactly the right bucket for the conditions prevailing at your plant write today for Catalog No. 2002.

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of Blaw-Knox Company
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BLAW-KNOX Clamshell BUCKETS

Save by using

HIGH CARBON CHROM-X

REGISTERED TRADEMARK
(REG. U.S. PAT. OFF.)

EXOTHERMIC FERROCHROMIUM

NOTE THESE SAVINGS WHICH ARE BEING ENJOYED BY USERS OF CHROM-X

1. **SAVING** of Chromium, by controlling chromium addition and carbon pick-up to the exact required specification;
2. **SAVING** of Chromium, by increasing Chromium recovery above 93%;
3. **SAVING** of steel, by avoiding off-heats due to poor chromium distribution;
4. **SAVING** of fuel, refractories and labor by decreasing furnace time;
5. **SAVING** of melting time by making more than one grade of iron from the same base metal through ladle additions;
6. **SAVING** of labor by avoiding the necessity of weighing and analyzing Chrom-X.

Write for new folder "For Better Results in Steel Plant and Foundry".

Also SIL-X

REGISTERED TRADEMARK
(REG. U.S. PAT. OFF.)

EXOTHERMIC FERROSILICON

provides molten ferrosilicon at desired spot, whether in furnace or ladle, and results in cleaner metal at lower cost. Two grades—"75" and "145".

Service Office at:
710 Ohio Merchants Trust Building
Massillon, Ohio

CHROMIUM

MINING & SMELTING CORPORATION
LIMITED
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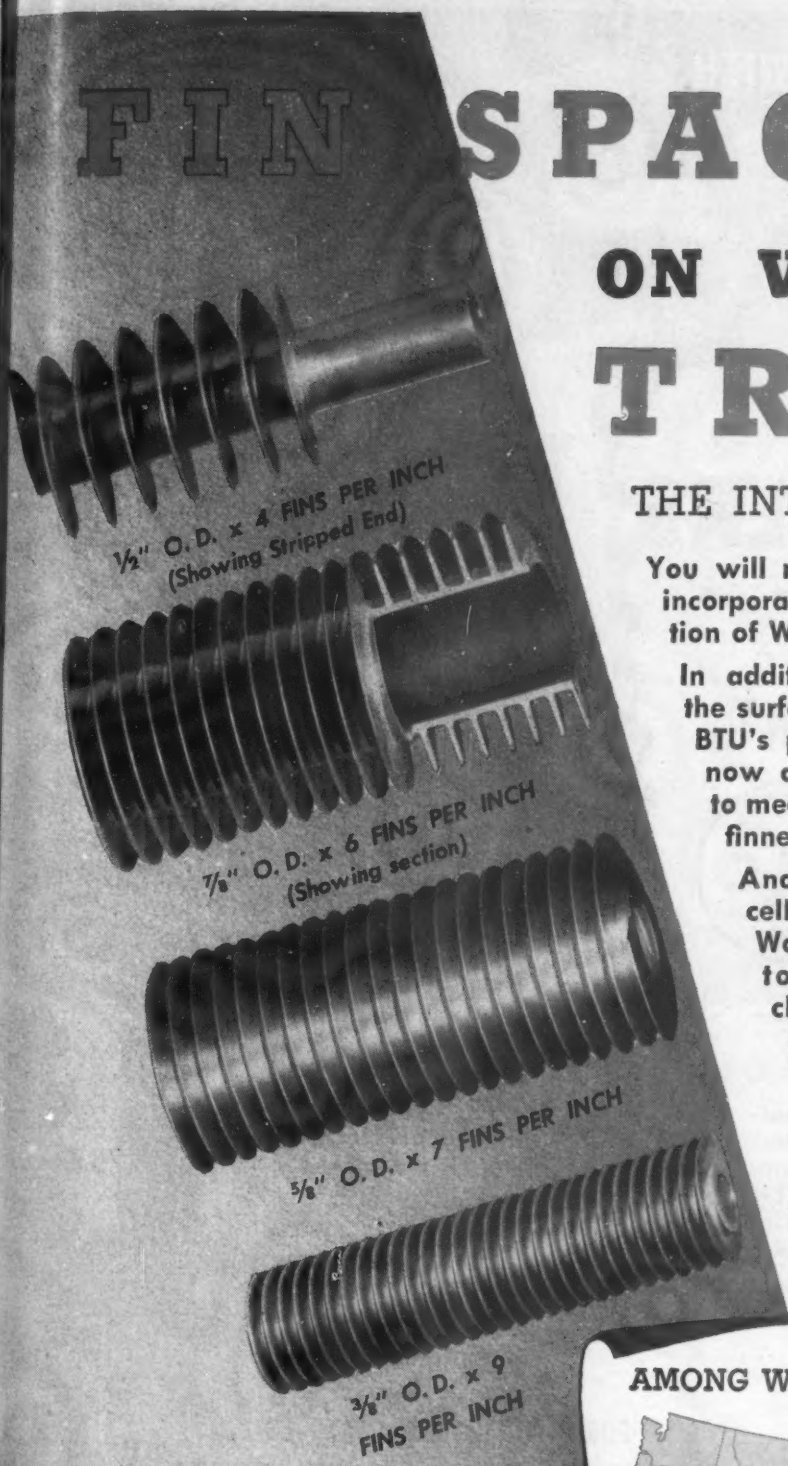
***Sales Agents in U.S.A.* — MILLER & COMPANY, 332 South Michigan, Ave., Chicago, Ill**

FIN SPACINGS ON WOLVERINE TRUFIN

THE INTEGRAL FINNED TUBE



You will readily recognize the advantages incorporated in the all-one-piece construction of Wolverine TRUFIN Tubing.

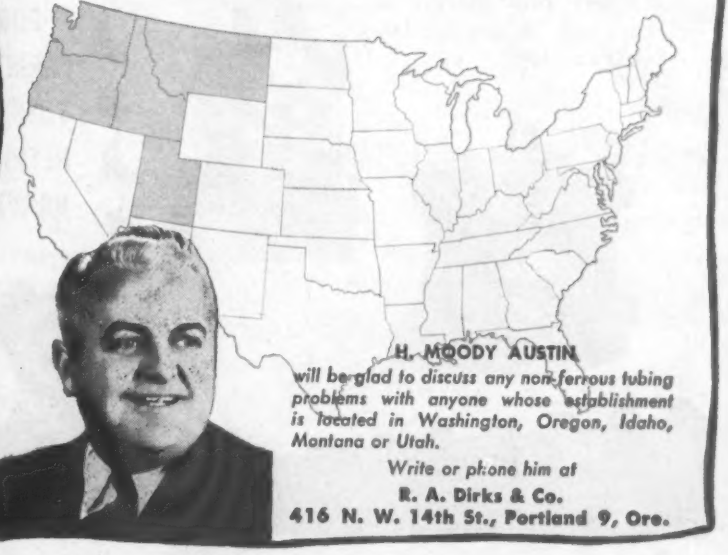
In addition to giving you many times the surface of plain tube and many more BTU's per dollar, Wolverine TRUFIN is now available in various fin spacings to meet the further requirements of your finned tube applications.

Another distinct advantage is the excelled efficiency and performance of Wolverine TRUFIN when subjected to severe vibration or sudden changes in temperature.

Fabrication is not a problem to the users of Wolverine TRUFIN, for it can be bent or formed as your application demands.

Compiled expressly for your further information is Wolverine TRUFIN Form 651. Write for your copy today.

WHO'S WHO
AMONG WOLVERINE REPRESENTATIVES



H. MOODY AUSTIN

will be glad to discuss any non-ferrous tubing problems with anyone whose establishment is located in Washington, Oregon, Idaho, Montana or Utah.

Write or phone him at

R. A. Dirks & Co.
416 N. W. 14th St., Portland 9, Ore.

WOLVERINE
TUBE DIVISION

CALUMET & HECLA CONSOLIDATED COPPER COMPANY

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In Canada: UNIFIN TUBE CO., LONDON, ONT.

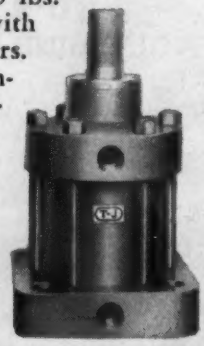
MORE SPEED...LESS COST WITH

for TOUGH JOBS!

T-J CYLINDERS *Simplify* — POWER MOVEMENT

FOR PUSH-PULL-LIFT JOBS... 100 LBS. OR 50,000 LBS.

Apply a T-J Cylinder to eliminate muscular effort or to simplify mechanical movements—the ideal way to clamp, press, raise or shift in any direction. T-J Engineered and built in many styles, sizes and strokes to meet your requirements... exerting power movement of 100 lbs. to 12,000 lbs. (direct) with T-J Air Cylinders... 1,000 lbs. to 50,000 lbs. (direct) with T-J Hydraulic Cylinders. Easily and quickly installed. Write for latest catalog.

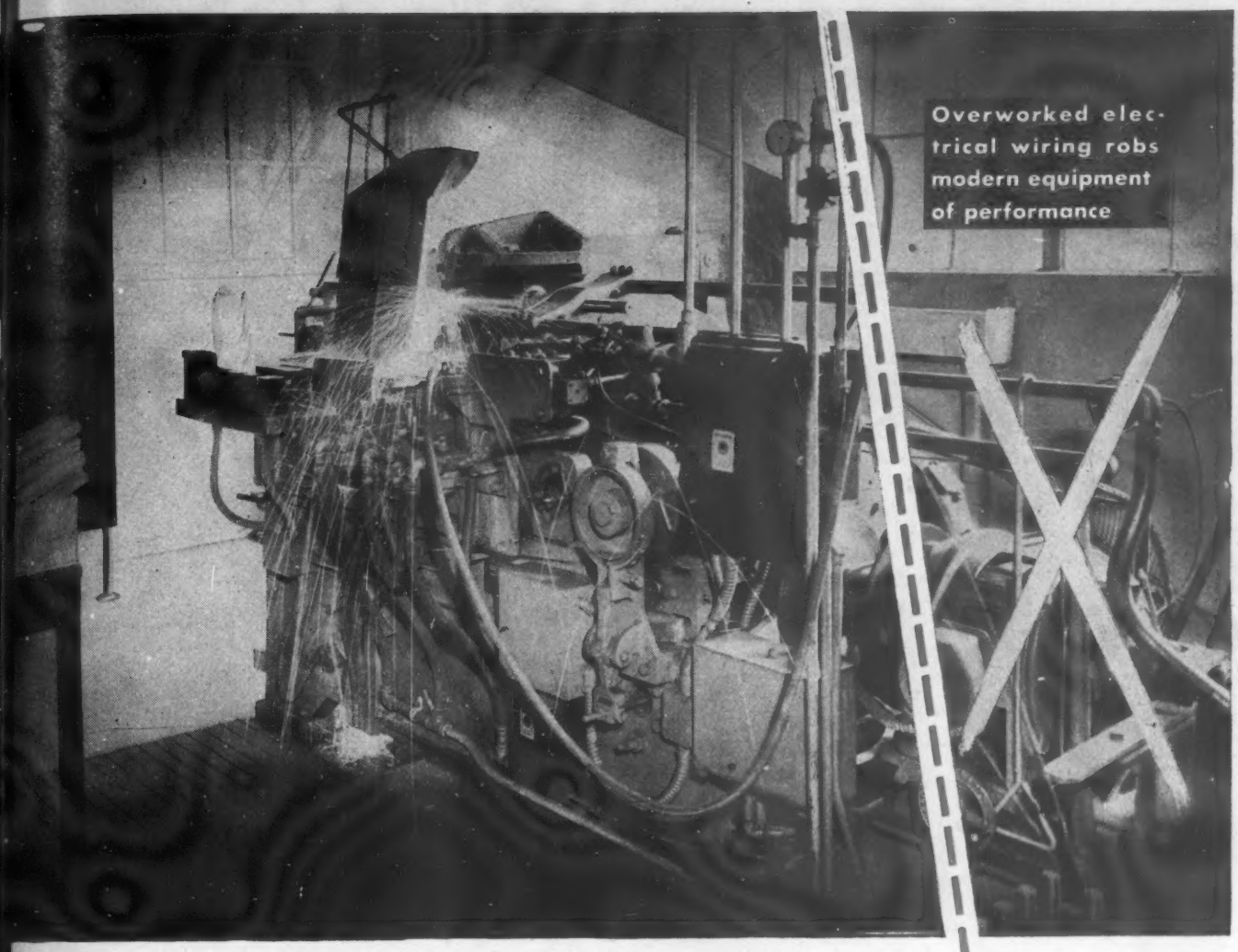


T-J RIVITOR *Sets 'em fast*

Here's speedy, efficient, automatic-feed riveting to help you increase production and cut costs—the machine for the job is the T-J RIVITOR! Electrically powered for automatically feeding and setting solid steel rivets 1/16" to 1/4" dia. incl., and up to 7/8" incl. long. Work requiring up to 36" throat depths can be accommodated. Ruggedly built... designed with T-J know-how based on 28 years experience ...Write for bulletin.
The Tomkins-Johnson Co.,
Jackson, Mich.

FOR AUTOMOBILES... STOVES... FARM MACHINERY... KITCHEN UTENSILS... TOYS... LAWN MOWERS... STAMPINGS... REFRIGERATORS... WASHING MACHINES... HARDWARE ITEMS... AND MANY OTHER USES...

TOMKINS-JOHNSON
RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS
T-J
28 YEARS EXPERIENCE



Assure full power for the future . . .

Wire ahead!

DON'T BE PENNY-WISE AND POWER-FOOLISH

WHY LOSE PART of the performance you pay for in important electrical equipment. Lack of proper wiring can reduce production capacity twenty-five to fifty per cent!

What about *your* wiring plans? Do they anticipate new electrical equipment, postwar expansion? It's far cheaper to revise blueprint wiring setups now than face costly shutdowns for alterations later.

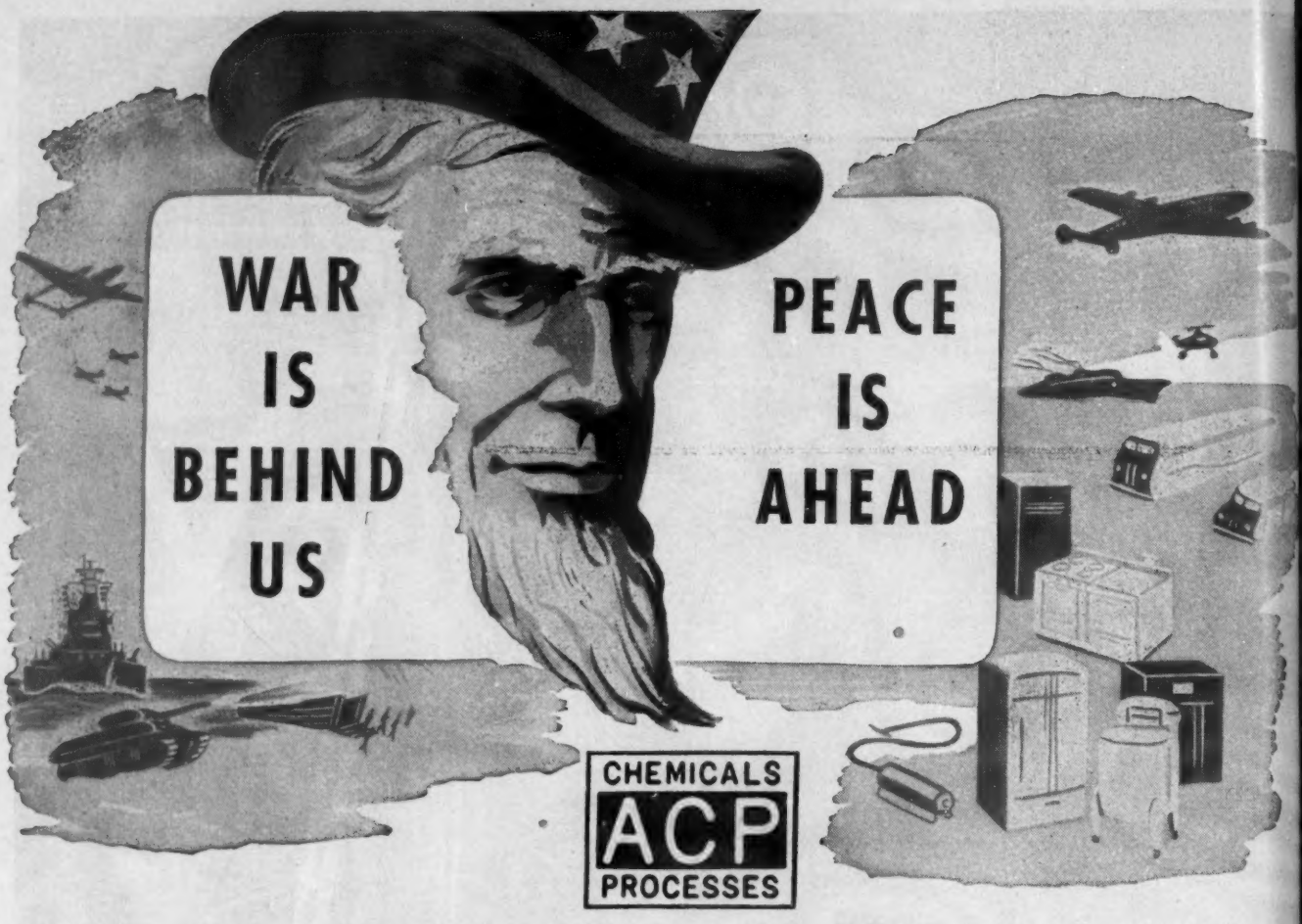
Make a reminder today! See consulting or plant power engineer—electrical contractor or power salesman. Get *their* angles on the need to Wire Ahead! Anaconda Wire & Cable Company, Subsidiary of Anaconda Copper Mining Company. General Offices: 25 Broadway, New York City 4. Chicago Office: 20 North Wacker Drive 6. Sales Offices in Principal Cities. 45310

✓ *Check your wiring plans before they check you!*

HELP BRING VICTORY SOONER . . . BUY MORE WAR BONDS

ANACONDA

ANACONDA WIRE & CABLE COMPANY



ACP Chemicals and Processes that helped win the War are now available to the metal-working industry to make more enduring the finishes on automobiles, farm machinery, refrigerators, washing machines and countless other necessities that will add comfort and pleasure to peacetime living.

210 A DEOXIDINE

Notable among these products is 210 A DEOXIDINE which has the distinct advantage of *cleaning* and *conditioning* at the same time; the combined operations are therefore carried thru in fewer stages—a saving in both time and equipment.

Power washers, heretofore used for alkali cleaning are satisfactory—also the large machines built especially for handling large production of large surfaces. Ordinary mild steel equipment is adequate—stainless steel is not required but may be used if already installed.

To Aid Rapid Reconversion

The simplicity of equipment and operation of 210 A DEOXIDINE Process will be a material aid to the metal-working industry in reconversion to peacetime production. The low cost and excellent results obtained with Deoxidine for cleaning and conditioning were proved in wartime production.

ACP has served industry thru two World Wars and the intervening years of peace. This experience in the removal and prevention of rust, in inhibiting pickling acids and other applications of chemicals to the metal-working industry is available to you to help speed your reconversion to normal production.

Our Technical Dept. will gladly assist you in the most effective application of our products to your manufacturing requirements. Write Dept. F-10.

MANUFACTURERS OF INHIBITORS AND METAL WORKING CHEMICALS

AMERICAN CHEMICAL PAINT CO.

AMBLER ACP PENNA.

Office and Warehouse
3665 Palmer Ave., Detroit, Mich.

Canadian Office and Factory
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Van Camp Products & Sales Co.
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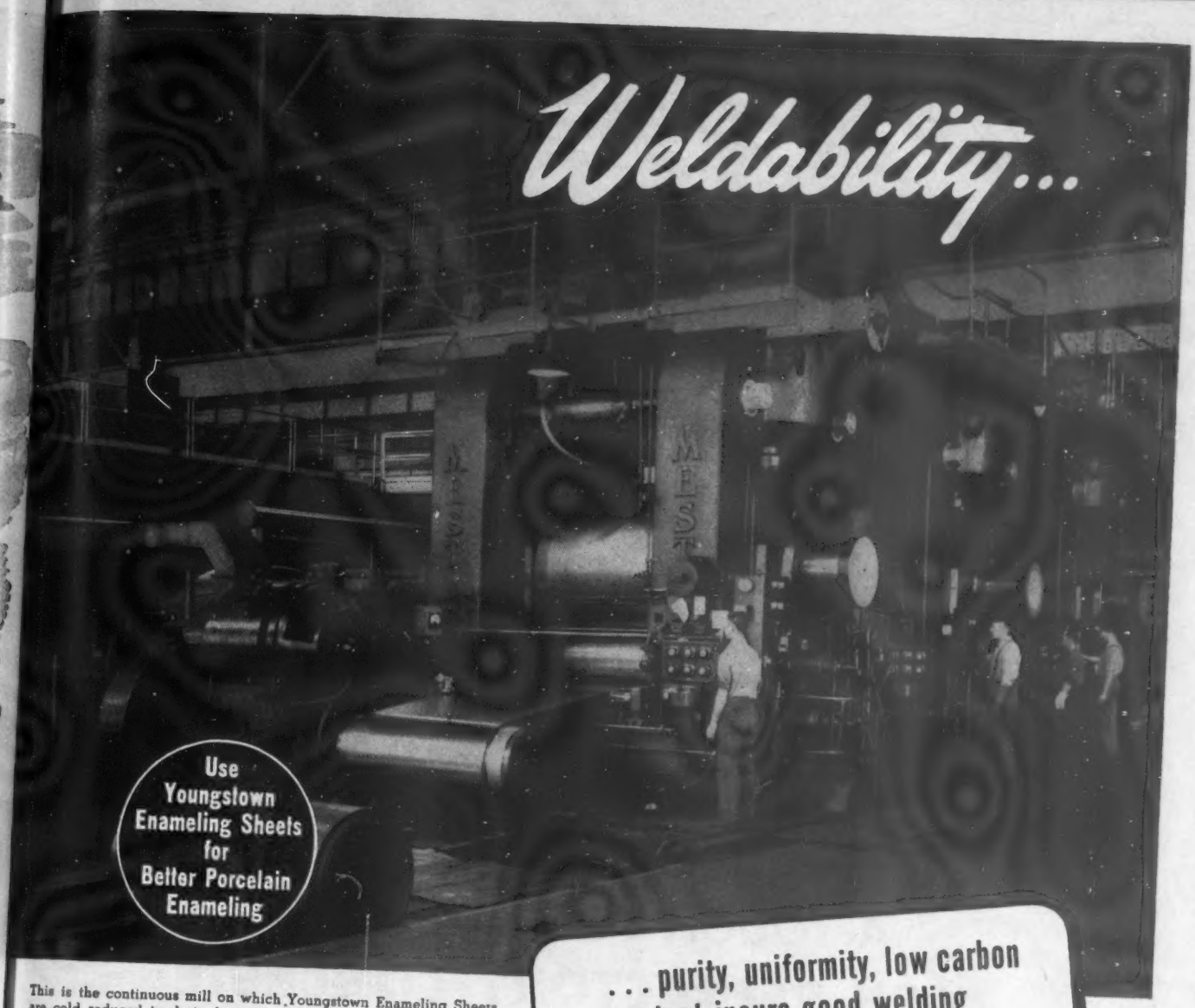
Weldability...



Use Youngstown Enameling Sheets for Better Porcelain Enameling

This is the continuous mill on which Youngstown Enameling Sheets are cold reduced to desired gauges. The various processes used in the manufacture of Youngstown Enameling Sheets result in a product of superior weldability, uniformity, purity and freedom from internal strains.

. . . purity, uniformity, low carbon content insure good welding

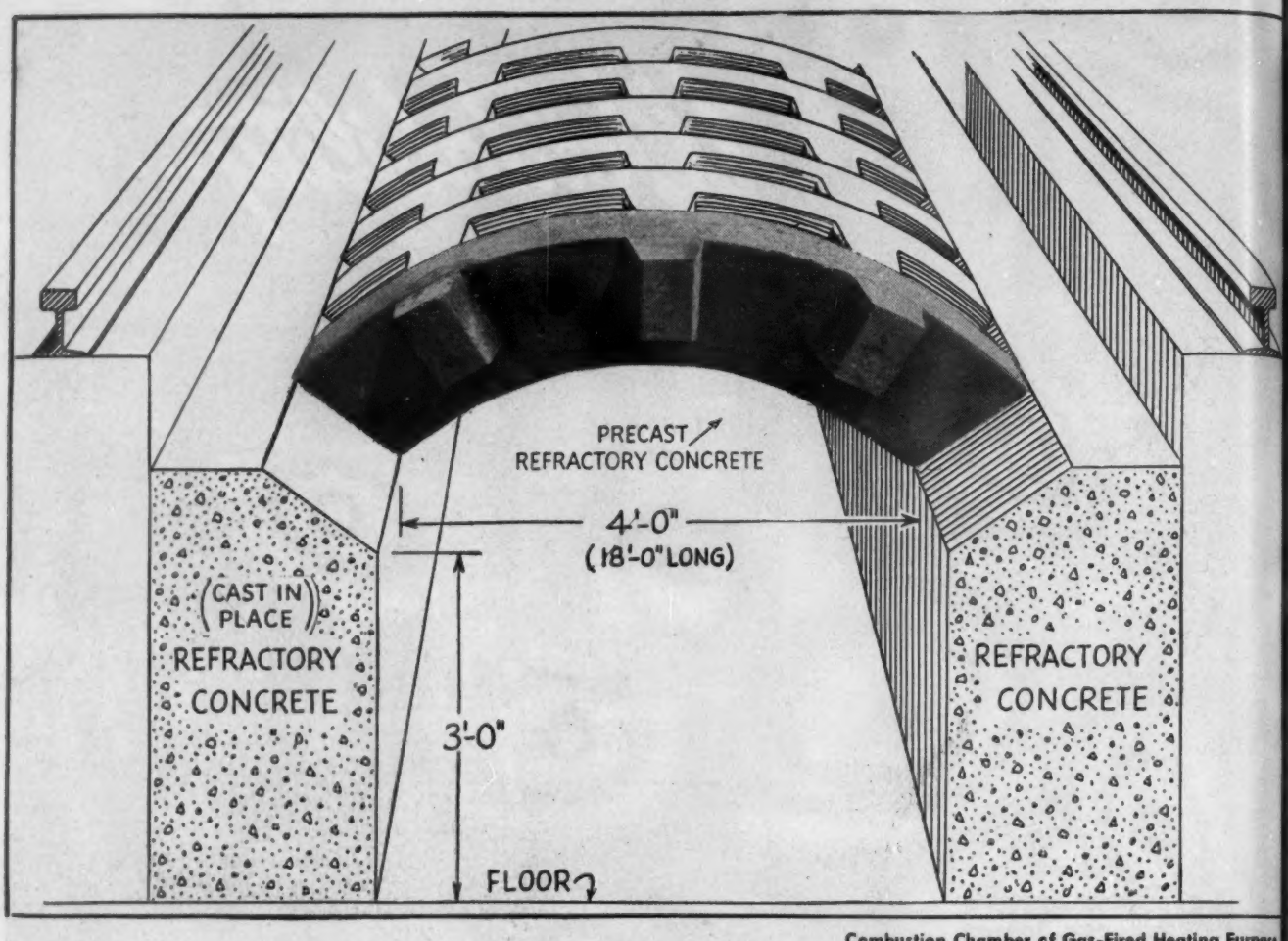
FOR many applications, weldability is a most important factor in the selection of an enameling sheet. You must be able to weld quickly, surely, at low cost, and without deformation or unsightly effect.

Ideal from this standpoint is the porcelain enameling sheet, as produced by Youngstown. Low in carbon content, and with a minimum of other disturbing elements, Youngstown sheets weld easily, rapidly, and dependably, by either electric or oxy-acetylene process.

Youngstown sheets satisfy the enamelist's other requirements, too--they combine ductility and strength, to more than meet even the most difficult deep drawing operations. They do not buckle or warp, in the enameling furnace or in service. Freedom from impurities and a specially rolled surface insure uniform pick-up of enamel slip and a porcelain finish without blisters or other blemishes.

Youngstown is at your service now. We welcome your inquiry.

YOUNGSTOWN
Enameling Sheets
THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN 1, OHIO
Manufacturers of
CARBON · ALLOY AND YOLOY STEELS
Sheets-Pipe and Tubular Products-Plates-Conduit-Bars-Electrolytic Tin Plate-Coke Tin Plate-Rods-Wire Nails-Tie Plates and Spikes



Combustion Chamber of Gas-Fired Heating Furnace

A TOUGH JOB MADE EASY WITH REFRACTORY CONCRETE

Big precast refractory units solve construction problem, eliminate maintenance trouble.

Each section for this combustion-chamber arch (4-ft. span) was cast in one piece with Refractory Concrete . . . made with LUMNITE. Precast right on the job, the units were easily picked up and set on the Refractory Concrete sidewalls—simple way to build a sprung arch with ample openings for heat distribution.

Skew-backs were formed by sloping the tops of the cast-in-place Refractory Concrete walls. The whole job was done without cutting or trimming . . . no mortar joints, no fancy mason work. And that means low maintenance, too, because the arch sections have no joints to open up, no small pieces to drop out. Each unit is a one-piece arch.

It's practical to make refractory shapes to fit *your* design . . . thanks to Refractory Concrete. The shapes fit the job; they're true to size, have sharp corners, flat planes and accurately matched faces. There's no prefiring, so no warpage.

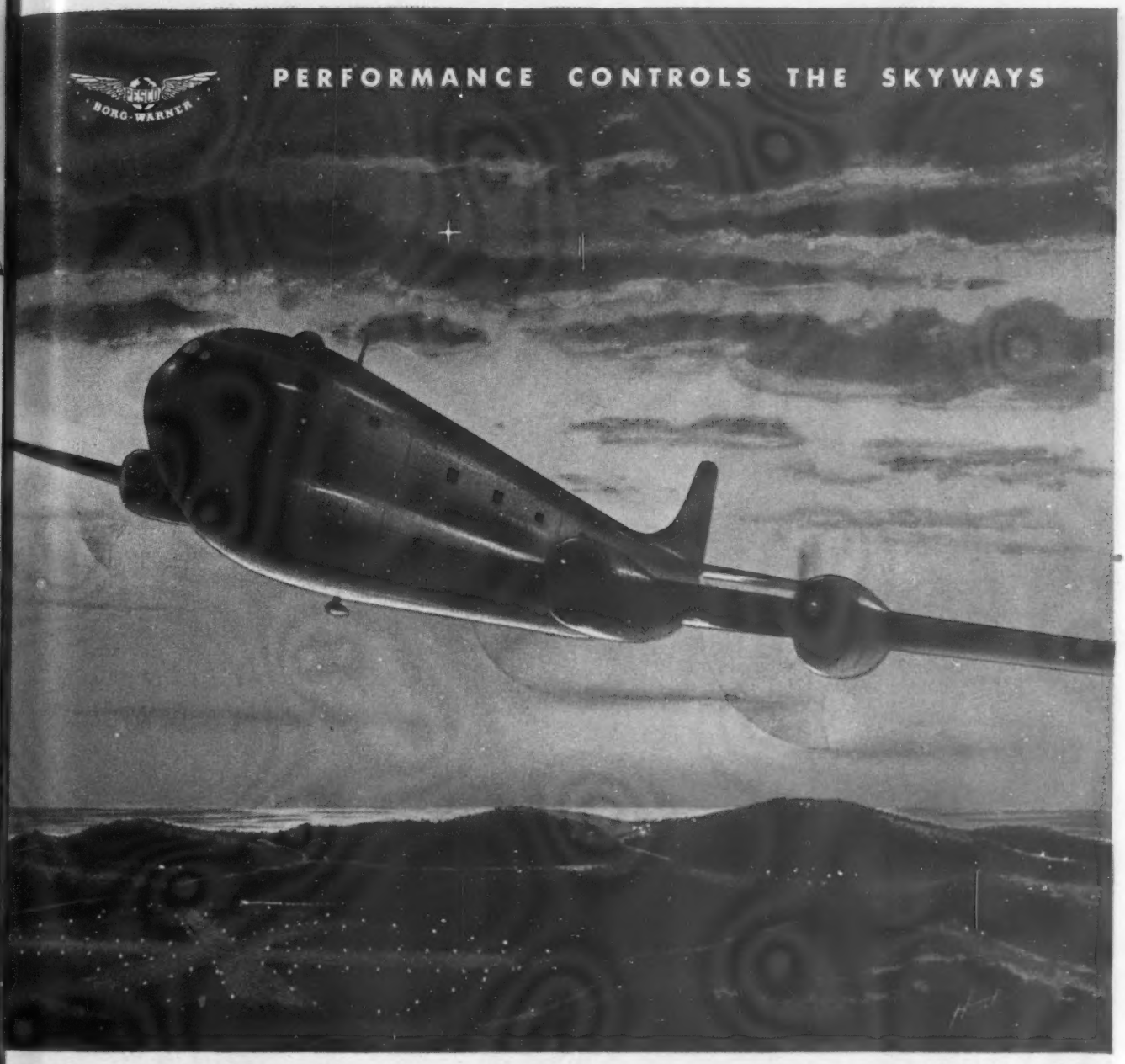
For freedom in design, furnace builders use Refractory Concrete . . . precast or cast-in-place. Sizes, sections, shapes, refractory and insulating properties are selected for greatest operating efficiency.

For new booklet, "Refractory Concrete for Furnace Construction," write: The Atlas Lumnite Cement Company (United States Steel Corporation Subsidiary), Chrysler Building, New York 17, N.Y.

LUMNITE FOR REFRACTORY CONCRETE

PESCO
BORG-WARNER

PERFORMANCE CONTROLS THE SKYWAYS



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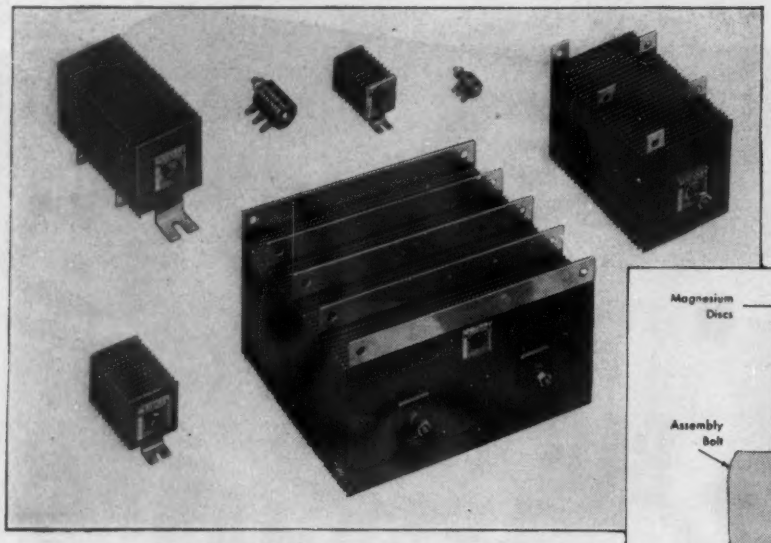

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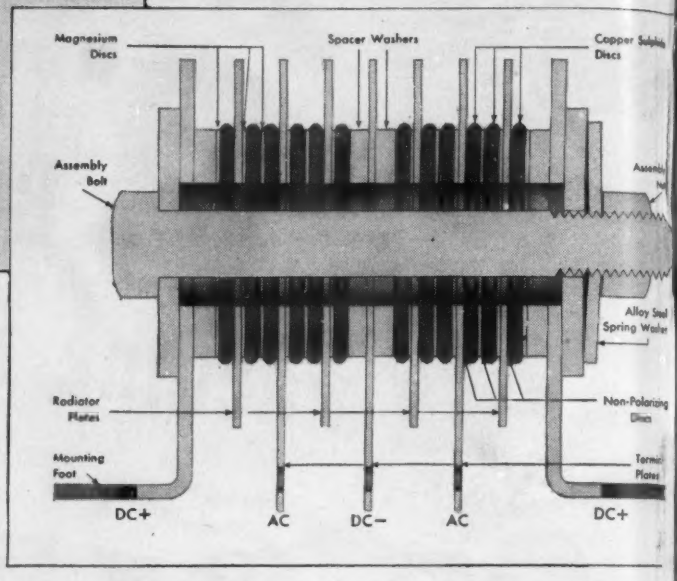

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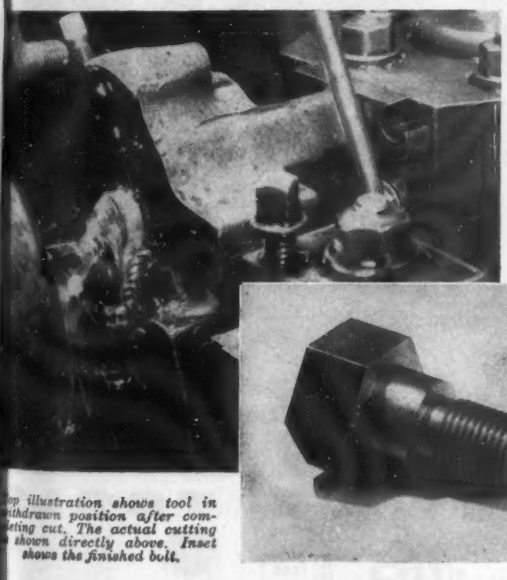

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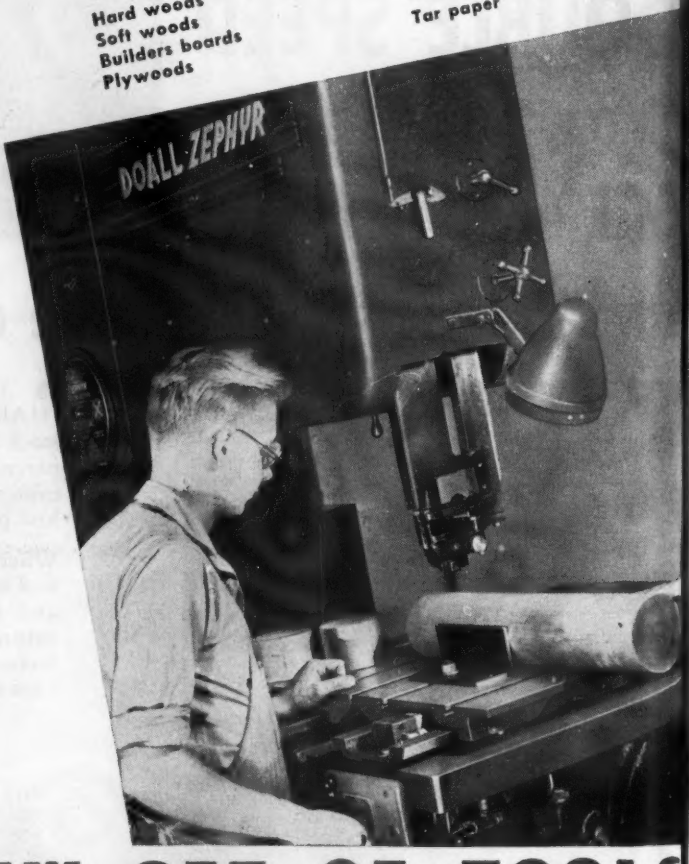

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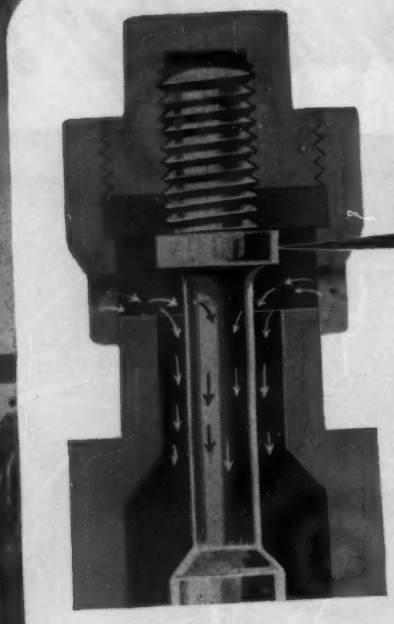

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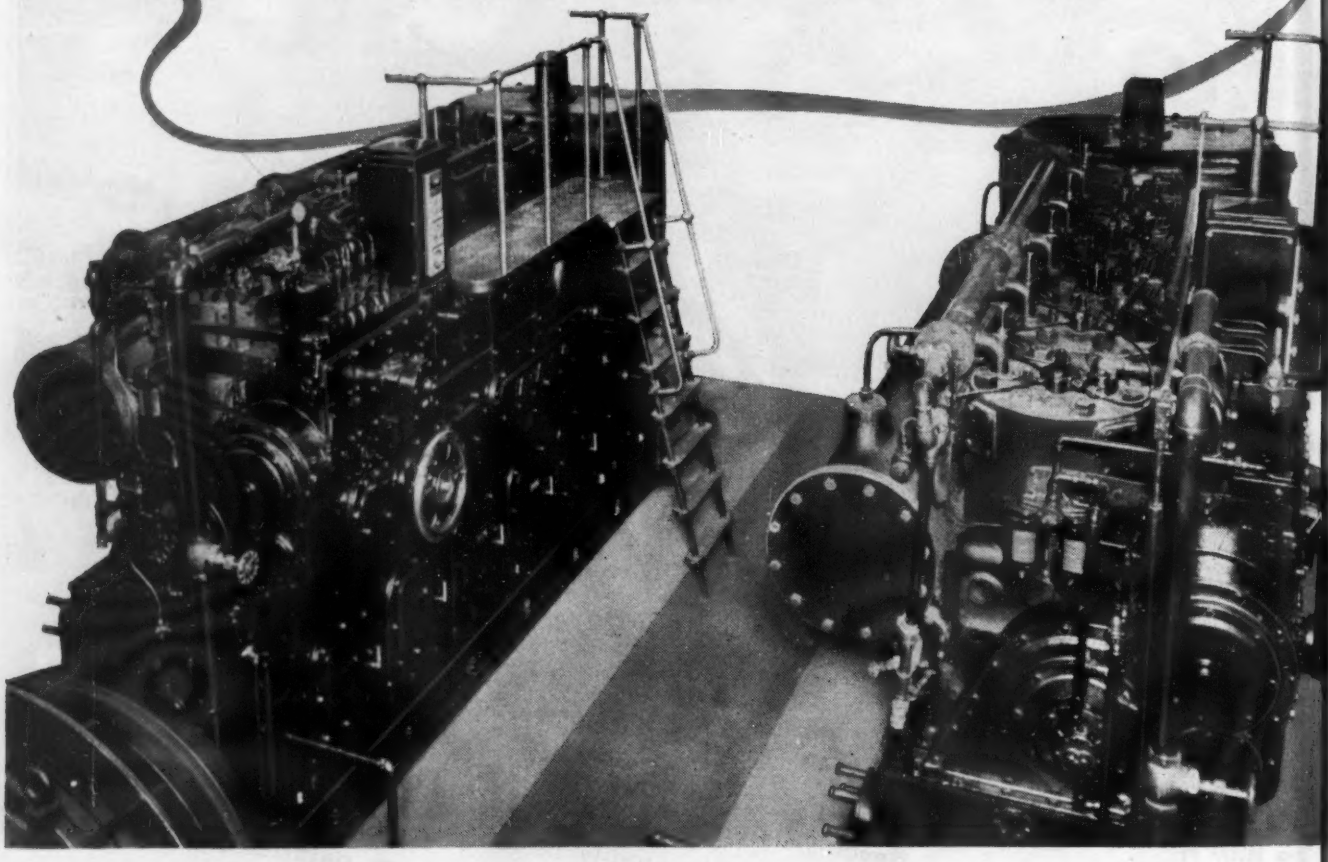

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 117, NO. 16 OCT. 15, 1945

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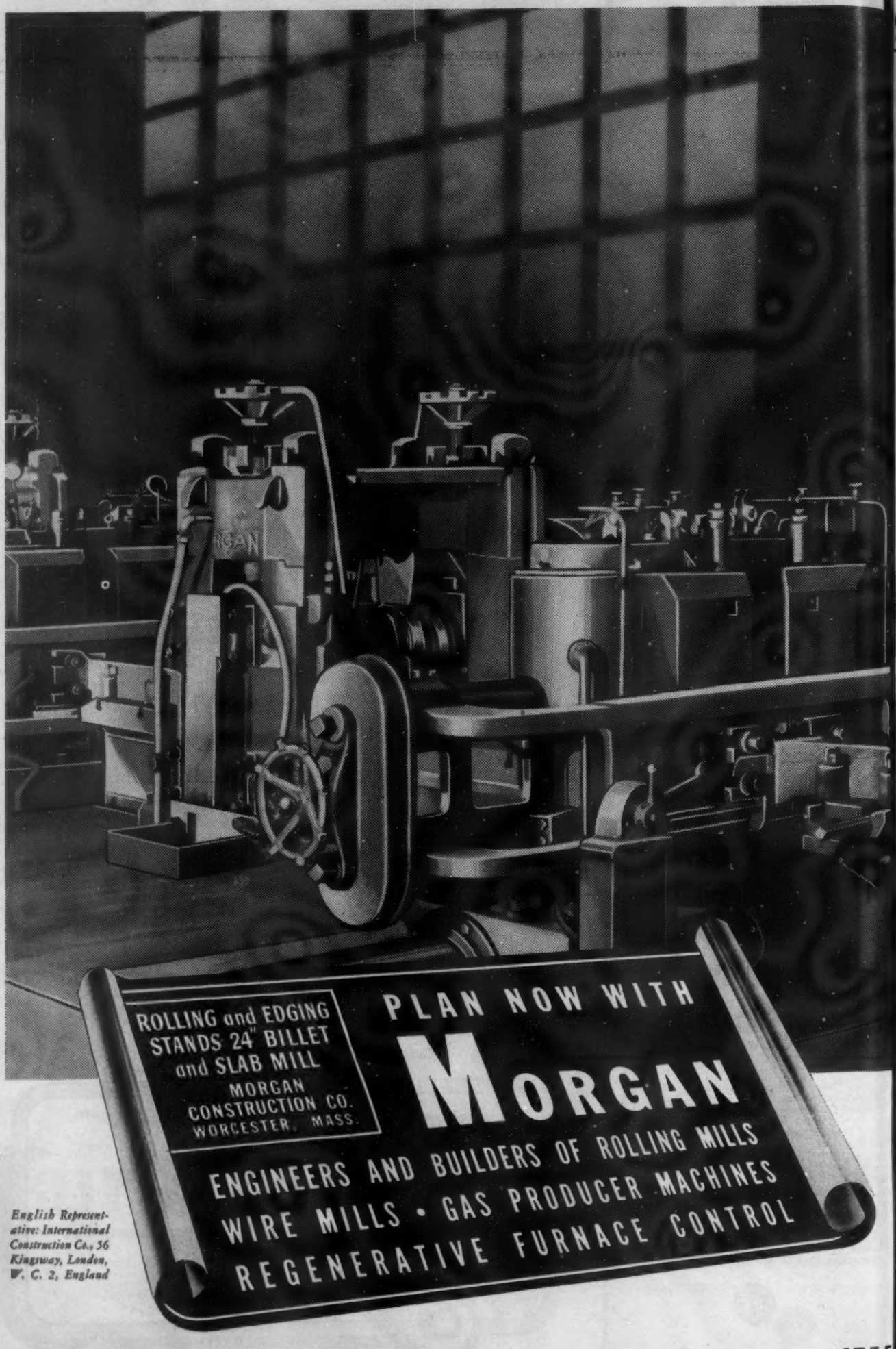

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STEEL
October 15, 1945

Down To Earth!

At a time when strikes are delaying the progress of reconversion by precious weeks and months, it must come as a rude shock to the American people to know that their government not only admits that it has no policy with which to meet the present wage and price situation but also confesses that its top-flight administrative officers are confused by conflicting economic theories.

Although it has been clear to everybody for at least six months that widespread demands for wage increases would be forthcoming shortly after V-J Day, it was not until early last week—after the nation had been subjected to the inconvenience of hundreds of work stoppages—that the government administration set out in earnest to develop a pattern for solving this problem. Not until then was it announced that Judge John C. Collet, new head of the Office of Economic Stabilization, would call a conference of representatives of the Department of Labor, OPA, WLB, and OWMR and would ask them to submit their "conflicting" views as to what the government should do in the present crisis.

That the government is fumbling for a plan was further revealed by harassed Secretary of Labor Lewis B. Schwellenbach who, according to a United Press dispatch, disclosed that "top administration economic and labor officials are confused by the conflicting advice of economists who worry on the one hand about inflation and on the other about the loss of purchasing power." A similar tone of helplessness is found in recent statements of John W. Snyder, director of OWMR.

This seeming inability of the government to deal effectively with the wage and price aspects of reconversion arises first from the tendency inherited from the New Deal to give theory priority over practice and secondly from the bureaucratic technique now firmly entrenched in Washington which automatically guarantees that every problem that comes up for solution shall be clothed with as many technicalities and complications as possible before it is handed to the policy makers for decision.

There is nothing in the present mess that cannot be settled satisfactorily by three good men working under favorable conditions. A competent and fair-minded government official, labor union leader and employer, closeted in a plant office in an industrial area and guarded against the intrusion of specialists, advisers, lawyers, economists, politicians or other kibitzers, could draft a plan that would work.

Government policy-making should be down-graded to a level where things can be done.

VERSATILE PERSONNEL: Announcement by the Navy that 696 vessels were sunk during the war by enemy action or other causes reveals part of the high price paid for victory. At the same time, the fact that in spite of these unprecedentedly heavy losses, the Navy at the end of the war had a fleet of 40 aircraft carriers, 79 escort carriers, 24 battleships, 3 battle cruisers, 33 heavy cruisers, 57 light cruisers, 450 destroyers, 359 destroyer escorts and 263 submarines is impressive evidence of the ability of American industry to build and equip naval strength much faster than the most destructive naval war in history could sink it.

A large share of the credit for industry's effective war effort, not only in ship construction but in all phases of production for war, should go to the War Production Board for its co-ordination of the work of tens of thousands of individual industrial companies. This agency, which will fold up its affairs next month, was staffed largely by executives loaned to the government by private industrial and business concerns. Often working under the handicaps of

(OVER)

shifting and uncertain government policy and anti-business antagonism, they achieved a brilliant record of accomplishment.

Their contribution to the success of WPB is convincing testimony of the versatility of industry's executive personnel. —p. 85

• • •

SOMETHING'S DOING: Ever since last April when the United States Supreme Court ruled the basing point system of pricing violated provisions of the Robinson-Patman Act it has been a foregone conclusion pricing practices in many industries were in line for overhauling. One of these industries is steel.

That pricing practice is receiving considerable thought in steel sales offices these days is clear. In September stainless steel producers abandoned the single basing point system for multiple basing points in the sale of their products, this being the first direct reaction to the Supreme Court's decision in April. Now, it is reported, tool steel producers plan somewhat similar action.

Changes in stainless steel and contemplated action in tool steel, more or less specialized products, undoubtedly are but the first of a series of moves in the direction of making the overall steel price structure legally unassailable. This merits close watching by all industry since it has far-reaching implications for a wide area of the economy. Any revamping of established pricing practice in steel is bound to have repercussions far beyond the confines of the steel industry proper. —p. 88

• • •

FUTURE FINISHES: Included in the program of a recent meeting of the Electrochemical Society were a number of reports of extraordinary interest because in addition to summarizing process and product improvements of the past decade, they reveal the hitherto secret fruits of war-inspired laboratory activity on the part of protective coating manufacturers. Data presented may provide a good argument for redesign of metal products to take advantage of extended service life or lower production costs.

Outstanding developments include nickel plated pipe for chemical process equipment which can be hot bent and cold extruded; improved anodic coatings for aluminum; hard chromium plating with two types of porosity to aid lubrication of engine cylinder walls; corrosion-resistant porcelain enamels completely resistant to solvent action of hot water under pressure, and their use in heating elements of electric stoves; and high efficiency of electrostatic spraying and detearing equipment to control uniformity of coating when applying paints and lacquers. —p. 116

POSTWAR POSTSCRIPTS: Unusually heavy export steel demand is in prospect but it appears doubtful if producers can handle more than a fraction of the total volume for months to come. Due to pressure of demand for domestic consumption (p. 86), some of the larger steelmakers are limiting export quotas to 10 per cent of total shipments while certain smaller producers are showing practically no interest in foreign inquiry at all. . . . The hearings being conducted by several Senate committees on proposed legislation to place scientific research under government sponsorship (p. 90) takes on added meaning in the light of Gen. George C. Marshall's recommendation that an intensive program of research and development be instituted and maintained to give the nation supremacy in this field. Testimony of outstanding scientists as to how research can be promoted best merits closest attention. . . . Strike in the bituminous coal industry has cut into steel production but outlook for settlement of the discord and prompt resumption of suspended furnace operations is encouraging as the general labor situation throughout the nation eases (pp. 83, 99). . . . Move to pare government expenditures may cut off some important work being conducted by the Bureau of Mines (p. 92), work of great potential value for the future. Economy program may terminate mineral exploration and work on pilot plants for development of processes for producing various metals from low-grade ores. . . . As the result of intensified action to crystallize plans for the industrialization of China (p. 95) large business potentialities for American industry may be disclosed within the next few months. Blueprint now taking form. . . . Henry Kaiser appears to have every intention of staying in the steel business. That is the impression he gave last week while on a visit to Cleveland where he told a press conference he is convinced his Fontana plant can compete successfully not only with other West Coast mills but also with eastern mills shipping to the West by water (p. 105). . . . Quonset huts, developed for the armed services, have become a civilian commodity (p. 97) with orders being accepted from the public for the basic round-roofed steel structures. Production of these packaged buildings will be continued for industrial, farm and aviation purposes. . . . Containers made of steel and also of aluminum (p. 108) are finding wide use for shipping and storing surplus war materials running all the way from heavy machine tools and aircraft engines to delicate instruments and electrical appliances.

E. L. Shaner

EDITOR-IN-CHIEF

How long . . .

How long since your last hunting trip? How many years since you have taken a fall vacation? Now, perhaps, with travel restrictions eased and the pressure of war production lifted, you can get away for a few days. Pack up and head for the fields or lakes.

You men who buy steel have been under the most pressure. You surely have earned a brief bit of relaxation. So go ahead, enjoy yourself—the boys will carry on till you return. And when it comes to steel—please know that we will do everything we can to give prompt service while you are away.

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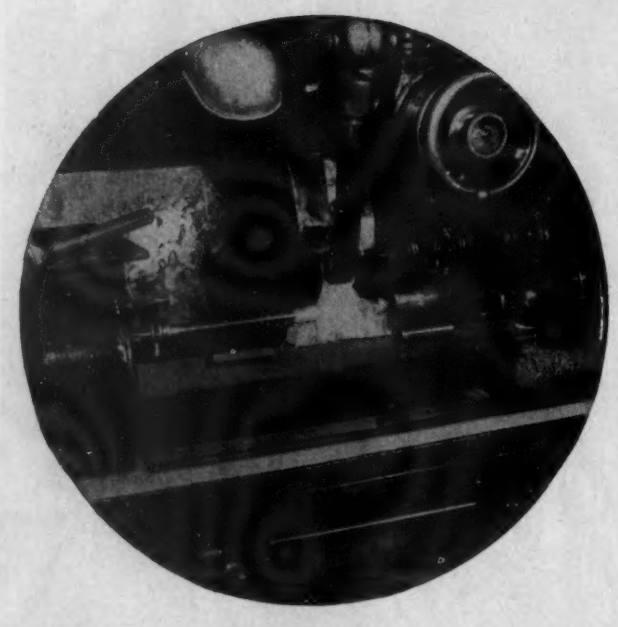

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RECONVERSION RUSTPROOFING

4 Points to Remember

1. Ordnance Specification P. S. 300-4 contains *official instructions* for the complete processing of Government-owned production equipment.
2. These instructions require that only rustproofing materials meeting Government specifications be used.
3. *Texaco rustproofing products meet Ordnance specifications for application on Government-owned equipment.*
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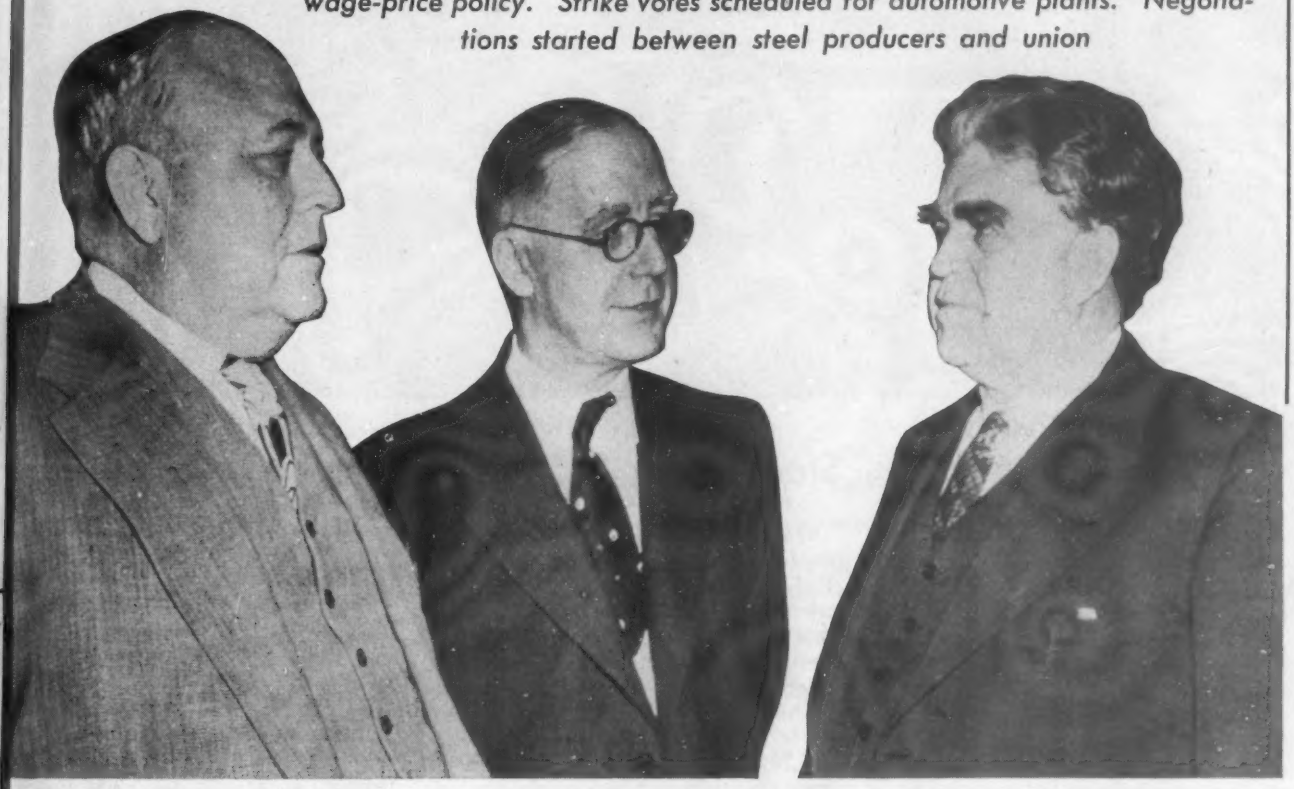
TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT — CBS

STEEL
October 15, 1945

Work Stoppages Ease; *Still Hinder Reconversion*

Iron and steel production drops sharply as result of coal mine strike. Fuel supplies, already below normal, dwindle to critical point. Heavy wage demands hang over most industries, with Washington still unprepared with wage-price policy. Strike votes scheduled for automotive plants. Negotiations started between steel producers and union



Striving for a truce to end the coal mine strike last week were, left to right: Ezra Van Horn, representing the bituminous operators; Secretary of Labor Lewis B. Schwellenbach; and John L. Lewis, head of the United Mine Workers. NEA photo

ALTHOUGH the work stoppages which have been plaguing the reconversion program had eased somewhat by week's end, little could be found in the labor picture to encourage industrialists attempting to resume large-scale output of civilian goods.

The wage and price situation continues in a desperate muddle. Demands for large wage increases, generally 30 per cent, hang over most segments of industry and are backed up by strike threats. The government has not yet evolved any clear-cut wage-price policy and top administration spokesmen express conflicting views about what should be done.

Industry, which before the war's end believed the physical problems of reconverting plants and the obtaining of materials would be the chief reconversion problems, now finds the wage and price problem to be the chief obstacle to full production.

Typical of the situation is the automotive industry. For the first time in weeks Detroit is without a major strike, but the United Automobile Workers are preparing groundwork for an industry-wide tie-up should its demands for a 30 per cent wage adjustment fail. Strike votes are scheduled in plants of all three leading producers. The stoppages to date have seriously slowed the resumption of passenger car production and builders doubt that previously established goals for 1945 can be attained.

In Pittsburgh and other steelmaking centers negotiations between the United Steelworkers and steel producers were opened on the union's demand for a $2-a-day wage increase. Steelmakers generally hold that greater productivity and steel price adjustments must precede any wage boost. Most steel products now are being produced at a loss under present wage rates and in recognition of this the Office of Price Administration last week recommended to the Office of War Mobilization and Reconversion that steel prices be advanced an average of $2 a ton to compensate producers for added costs incurred during the war. The recommended price increase does not cover any future wage increase.

Meanwhile steel production was suffering from the coal shortage caused by the strike of the United Mine Workers over the issue of organizing mine foremen and supervisors. The national operating rate dropped 8½ points to 73½ per cent of capacity last week as a direct result of the coal strike.

Pig iron and coke production were affected even more sharply. In the Pitts-

Normally one of the world's largest coal piles, averaging 150,000 tons, the Clairton Works of Carnegie-Illinois Steel Corp. has been hard hit by the mine strike

burgh district only 31 of 54 blast furnaces were in operation at week's end and many of these were on reduced blast. Further curtailments were scheduled over the week end should the coal strike continue. Three thousand men in iron and steel plants were idle because of the coal shortage.

In the Chicago district only 26 of 41 stacks were making iron.

Loss in coal production resulting from the strike last week had risen to more than a million tons a day and more than 180,000 miners were idle. Stocks of iron and steel producers and many other metalworking plants have dwindled to a critical point. Pittsburgh steel plant stocks average only four to five days' supply, and other industrial plants have an average of 20 days' stocks.

Many coke plants already have closed and others have sharply curtailed output. The huge Clairton by-products works of Carnegie-Illinois Steel Corp. was down to 50 per cent of capacity last week and was scheduled to go down to 31 per cent over the week end unless coal shipments increased.

Effects of the coal strike will continue to be felt long after mining is resumed inasmuch as coal production to the end of September was 33 million tons, or more than 7 per cent, behind output in the comparable period of 1944.

Steel Ingot Production Gains in Septembe

STEEL production in September, the first full month after the end of the war, climbed back to a total of 6,008,403 tons, just 351 tons below the peak month of 1929, which still stands as the best peacetime year for steel production on record.

September production, according to the American Iron & Steel Institute, rose nearly 5 per cent over the August total of 5,736,376 tons. In September 1944, however, production was 7,235,111 tons.

For the first nine months of this year production of 61,886,532 tons was more than 8 per cent below output of 67,375,801 tons in the corresponding period i 1944.

During September the steel industr operated at 76.6 per cent of capacit compared with 70.7 per cent in Augus and 94.0 per cent in September a ye ago.

An average of 1,403,832 tons of ste was produced per week during Sep tember, as against 1,294,893 tons pe week in August and 1,690,446 tons pe week in September 1944.

STEEL INGOT PRODUCTION STATISTICS

	Estimated Production—All Companies								Calculated weekly	Num
	—Open Hearth—		—Bessemer—		—Electric—		—Total—		produc-	ber
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	tion, all companies Net tons	of weeks in m
Based on reports by companies which in 1944 made 97.9% of the open hearth, 100% of the bessemer and 86.7% of the electric ingot and steel for castings production										
1945										
Jan.	6,468,815	90.5	379,062	76.0	358,346	77.3	7,206,223	88 8	1,626,687	4.4
Feb.	5,967,842	92.4	347,227	77.1	339,520	81.1	6,654,589	90.8	1,663,647	4.0
Mar.	6,927,377	96 9	398,351	79 8	382,237	82 4	7,707,965	95.0	1,739,947	4.4
1st qtr.	19,364,034	93.3	1,124,640	77.6	1,080,103	80.2	21,568,777	91.6	1,677,199	12.8
Apr.	6,541 097	94 4	372,952	77 2	377,877	81 4	7,291,926	92 8	1 699 750	4.2
May	6,663,577	93.2	402,100	80.6	386,075	83.3	7,451,752	91.8	1,682,111	4.4
June	6,129,266	88.5	379,807	78.6	333,217	74.2	6,842,290	87.1	1,594,939	4.2
2nd qtr.	19,333,940	92.1	1,154,859	78.8	1,097,169	80.6	21,585,968	90.6	1,659,183	13.0
1st hlf.	38,697,974	92.7	2,279,499	78.2	2,177,272	80.4	43,154,745	91.1	1,668,139	25.8
July	6,318,463	88.6	381,832	76.7	286,713	61.9	6,987,008	86.3	1,580,771	4.4
Aug.	5,171,925	72.3	347,088	69.5	217,363	46.9	5,736,376	70.7	1,294,893	4.4
Sept.	5,458,130	79.0	352,884	73.2	197,389	44.1	6,008,403	76.6	1,403,832	4.2
3rd qtr.	16,948,518	80.0	1,081,804	73.1	701,465	51.1	18,731,787	77.9	1,426,640	13.1
9 mos.	55,646,492	88.4	3,361,303	76.5	2,878,737	70.5	61,886,532	86.6	1,586,834	39.0

For 1945 percentages are calculated on weekly capacities of 1,614,338 net tons of open hearth, 112,658 tons of bessemer and 104,640 tons of electric ingots and steel for castings, total 1,831,636 tons; based on annual capacities as of Jan. 1, 1945 as follows: Open hearth 84,171,5 net tons, bessemer 5,874,000 tons, electric 5,455,890 tons.

Decline in Industrial Production To Halt by Early 1946, Says Krug

Index of civilian goods output, based on 1939, rose from 51 per cent in August to an estimated 60 in September and is expected to reach 153 in December and 238 in June of next year. War needs absorbed two-fifths of national output

DECLINE in industrial production, which marks the war-to-peace period, will be halted by early 1946, J. A. Krug, chairman, War Production Board, predicted in his report on "Wartime Achievements and the Reconversion Outlook," just presented to members of the board.

In another report issued a few days earlier, he said industry is ready to meet the long pent-up demand for civilian goods by doubling its production records of 1939. Actual August, 1945, civilian production of 59 selected industries was up to 51 per cent of the average month base period of 1939; September production is estimated to be 60 per cent; the forecast for December is for 153 per cent; and for June, 1946, it is expected to be 238 per cent of the 1939 base figure.

Mr. Krug pointed out that these figures represent what industry feels it should be able to do through the first half of next year and warned that these forecasts must be studied in the light of many possible complications, such as are involved in the present wage and price problems which might retard the accomplishments of the production levels indicated.

Average monthly dollar production by 1222 companies in the 59 industries for 1939 was $405,250,000. The actual August, 1945, production was $210,174,000; estimated for September, $245,421,000; and the forecasts for December, 1945, and for June, 1946, $620,769,000 and $965,119,000, respectively.

Less Difficult Than War Job

Our problems of reconverting to peace seem "a far less difficult task than the one we have performed so well in the past five historic years," Mr. Krug said in his presentation of the reconversion outlook. In heretofore confidential munitions production figures, Mr. Krug revealed that in hurling more than $186 billion worth of planes, ships, guns and other material against the Axis, the United States had "demonstrated a degree of resourcefulness, strength and productivity far greater than many dared to imagine a few years ago." The rise in the nation's industrial output, doubled in five years, exceeded the pace of the recovery from the depression of the 1930s "when we were merely recovering lost ground instead of pushing forward to successive new highs," the report said. Employment in manufacturing alone increased 6,407,000 from 1939 to 1944, in which year the manufacturing industries as a whole provided work for almost a third of all civilians gainfully employed.

Great as the war effort was, "at no time during the struggle did it absorb more than two-fifths of our national output," Mr. Krug said. He disclosed the following production figures for the five war years: Aircraft, some $44,442 million; ships (naval and maritime), $40,694 million; guns and fire control, $10,801 million; ammunition, $19,734 million; combat and motor vehicles, $21,529 million; communications and electronic equipment, $10,659 million; other equipment and supplies, $38,148 million. None of these figures include expenditures on production of atomic bombs and other secret weapons.

Mr. Krug said it is much too soon to measure the progress of reconversion in terms of shipments of hard goods to civilian customers, although these shipments are expanding very substantially. Pipelines are being filled with raw materials and components, and the factories are going through the reconversion process of setting up production and assembly lines.

A new agency, the Civilian Production Administration (See STEEL, Oct. 8, p. 79), will take over on Nov. 3, those remaining WPB functions and controls that are required during the transition period of reconversion to accomplish the objectives laid down by applicable federal statutes and executive orders of the President. This new agency will be headed by J. D. Small.

CPA will use its powers, Mr. Small has announced, "to expand production of materials which are in short supply; limit the use of materials which are still scarce; restrict the accumulation of inventories. . . . ; grant priority assistance to break bottlenecks . . . . ; facilitate the fulfillment of relief and other essential export programs; and allocate scarce materials or facilities necessary for the production of low-priced items essential to the continued success of the stabilization program."

Present, Past and Pending

■ STEEL FREIGHT CAR WHEEL CEILING PRICES RAISED

WASHINGTON—Manufacturers' ceiling prices for classes 33-C and 33-D of wrought steel freight car wheels have been increased 18 per cent, effective Oct. 16.

■ PRICE CONTROL OVER CERTAIN METAL ITEMS LIFTED

WASHINGTON—Price control has been suspended, effective Oct. 16, by OPA over calcium metal, boron alloys, ferrophosphorus, lead bullet rod, nonferrous forgings and tool steel scrap.

■ AMERICAN BRIDGE TO MODERNIZE GARY, IND., PLANT

PITTSBURGH—American Bridge Co. plans modernization of its Gary, Ind., structural steel plant by increasing working area by about 10 per cent, rearranging fabricating facilities and production equipment, increasing welding and painting areas.

■ SURPLUS PROPERTY BOARD REPORTS ON STEEL PLANTS

WASHINGTON—The Surplus Property Administration last week reported to Congress on disposal of 29 steel and iron plants owned by the government or financed in large part from federal funds. Prospective earnings will be the primary yardstick in fixing prices of government owned plants, and not original costs.

■ ALLIES DISAGREE ON GERMAN STEEL OUTPUT LIMIT

WASHINGTON—Allied iron and steel experts disagree strongly as to how much steel shall be produced by Germany with Russia holding out for about 3 million tons; United States, 7 million; Great Britain, 11 million.

■ RADICAL TYPE OF COAL MINING MACHINERY DEVELOPED

WASHINGTON—Germany developed during the war a radically new type of coal mining machinery, the "coal planer," having 800 tons daily capacity. Its use swamped transportation and other correlated facilities.

■ FISHER BODY LETS CONTRACTS FOR HAMILTON, O., PLANT

DETROIT—Fisher Body Division, General Motors Corp., has let initial contracts for construction of a stamping and sheet metal plant at Hamilton, O.

■ GENEVA STEEL PLANT TO HALT STEEL PRODUCTION

GENEVA, UTAH—Geneva Steel Co. will discontinue steel production Nov. 12 but will continue pig iron production on a limited scale of one blast furnace and one battery of coke ovens.

Pressure for Domestic Deliveries

Demand for American steel from Europe and South America tremendous, but larger producers are limiting export quotas to 10 per cent of total output. Russia inquiring for heavy tonnage in wide range of finished and semifinished. Seeks government aid to satisfy needs for rehabilitation. Western Hemisphere republics have booked large quantities

NEW YORK

WHILE demand for American steel from foreign countries is tremendous, export shipments over the remainder of this year and the early part of next are expected to show little if any increase over the movement of the past nine months. This is due primarily to heavy pressure for steel in this country.

Some of the larger producers are limiting export quotas to 10 per cent of total shipments, and others, normally less interested in export, are paying little or no attention to foreign demand.

On the basis of present quotas, export departments of certain producers are now virtually out of the market until the middle of next year—and with the rehabilitation requirements of most war devastated countries scarcely more than scratched.

Heaviest pressure from abroad at present is coming from Russia. Within the past few weeks Russia has come out with large inquiries covering practically the entire range of semifinished and finished steel products. She is said to have now about given up thought of obtaining much semifinished, but is pushing hard for finished products. Particularly the Russians want sheets, the most scarce item on the list, due to huge domestic reconversion problems.

Whether Russia will be able to exert enough pressure on Washington to obtain what she wants remains to be seen, but, from all trade reports, she certainly is trying.

Russia Claims Priority

At present considerable export tonnage now on the books is for South America, much of it placed since last spring under FEA licenses. But Russia is taking the position that she as an active ally in the war and one standing badly in need of rehabilitation should be given preference, notwithstanding the fact that she has only recently come into the market for much of the steel that she is now urging for early delivery.

This situation has given rise to the possibility that Washington, through influence of the State Department, may provide an export priority rating which would provide at least some relief for Russia and perhaps certain other countries hard hit by the ravages of war. The nearest approach to any preference rating at this time would be a CC rating, which, of course, would disturb the domestic situation, as well as the export, and Washington has shown no signs of applying a CC rating in this instance. In fact, the War Production Board, is decidedly not disposed to issue CC ratings even where purely domestic requirements are involved, except as a last resort in breaking some particular bottleneck with a specified tonnage of steel or other material or a certain installation of equipment.

Freer Market Established

At present, steel exporters have more freedom in doing business and in selecting their accounts and in deciding how much they wish to sell abroad than at any time since before the war. The licensing system as it now exists provides for a general overall license to do business in steel abroad, except on a few products, requiring special licenses—pig iron, tin plate and galvanized sheets and possibly one or two others; and except on shipments to Spain and Argentina (there may be one or two others), where special licenses are still required for the shipment of any type of steel.

The major drawback is the stringency in supply because of the heavy demands at home; and generally speaking, Washington favors a limitation on export business to the end that reconversion in this country is not unduly retarded.

Other limitations, of course, arise from problems of exchange and financing, which never have been more difficult, although Export-Import Bank loans and the possible unfreezing of blocked assets should help in time. Further, while shipping is improving, there is still difficulty in getting bottoms when wanted for shipments to many parts of the world, and water rates, accordingly, are still fairly high. War risk insurance rates are easing, but probably will continue in effect for some time, for, even though the war is over, the hazard of floating mines remains. After World War I, it is pointed out, mines created a menace for many months.

Another unfavorable factor from the exporters' point of view is the fact that much of the current demand is coming through the purchasing commissions of foreign governments. In the long run, exporters would prefer to trade with private agencies, as it is possible in that way to build up stronger and more lasting commercial ties.

Following the termination of lend-lease and pending her efforts to obtain a loan of $3 to $6 billion, England has suspended a number of steel orders here and in some cases has actually canceled tonnage. But all of this is relatively small compared with the requirements from other directions, not only from the war devastated countries, but from others whose needs have accumulated during the war because of the drying up of their normal sources of supply and who look to the United States to meet their principal requirements for some time to come.

Because of the shortage of coal primarily, semifinished is in particular demand, not only from Russia but from Belgium, France and Italy; and if it were not for the United States needs, these countries would have no difficulty in getting it, for there is a price premium on export shipments.

For much the same reason (shortage of

...rie? ...recludes Higher Foreign Shipments

Heavy steel tank is hoisted aboard ship at a West Coast port for shipment abroad. Foreign demand for steel in practically all categories promises to continue heavy for the next several years. NEA photo

coal), pig iron also is in strong demand. Substantial orders have been placed tentatively by Sweden with American producers on the basis of their ability to deliver, or rather, more to the point, on the basis of their ability to obtain licenses from Washington. Sweden, however, was not a participant in the war nor has she any problems of war rehabilitation staring her in the face. Consequently, there is a greater disposition in Washington to help France and certain other countries obtain iron, at least some iron, in their present emergency.

France, it appears, is in particularly difficult straits, with steel operations said to be scarcely more than 10 per cent of capacity. There is the feeling in some quarters that France has not done what she should to help herself although badly handicapped at present by transportation; nevertheless there are problems which have to be faced and which make reasonable assistance from this country more or less mandatory. While her problems are not as great, Belgium has done much more to help herself, but even here she has not been able so far to get her steel production up to more than 30 per cent of capacity. Even Italy is being shipped some pig iron, it is said. While an enemy country until she collapsed, her problems are such that some help is necessary.

Although most European countries are interested in a wide variety of steel products, Norway and Sweden and also Denmark and Holland are inquiring mainly for ship steel (principally plates), tin plate, structurals and wire rods. Norway also wants skelp and sheet bars for her tin mills and at present is placing her requirements through a pooling organization, which is scheduled to go out of existence at the end of this year, after which, it is indicated, trading will be resumed with the individual consumers. Sweden, with her normal outside sources of fuel largely cut off, is anxious to obtain pig iron and other products above mentioned, and also stainless steel sheets and alloys.

Requirements in the Near East are principally wire products, pipe, sheets, a certain amount of tin plate and a limited tonnage of rails and plates, the latter for ship work, especially repairs, at Mediterranean ports. South Africa is interested principally in wire products, tin plate and sheets. Very little of the heavier steels, such as structurals and plates, will be moving to that area, it is said, because of increased production there in these lines during the war.

In principal demand by South America are reinforcing bars (reinforcing steel for most construction, compared with structural steel for the European countries), sheets, pipe, merchant bars, wire and tin plate. Heavy demand for a variety of products is now beginning to appear for the Philippines; China has a long list.

Movement of steel to Australia is not expected to be heavy for several reasons, one being that Australia has built up her steel industry to a considerable extent over recent years, and, in fact, will more likely be a competitor of the United States on certain products in the Far East. Canada is expected to remain among this country's best customers, although with her financial and economic position tied in so closely with England, much will depend upon the latter's ability to come out of her financial difficulties.

All in all, it appears that foreign demands will take as much steel as this country can spare for at least the next two years, if not longer, but that they will not be reflected in any early spurt in shipments over the next several months, because of the pressure of home needs.

Incidentally, surplus war steel, having been made principally to certain definite specifications, is not proving generally satisfactory for export.

American "Know How" Is in Demand in Other Countries

American "know-how" is in demand in many foreign countries and the Department of Commerce is compiling a list of United States firms qualified to furnish technical service such as plant design and layout of factories, production processes, machinery specifications and similar matters to fulfill this demand.

American industry now enjoys a worldwide reputation because of its tremendous influence in winning the war and this popularity is in a large measure responsible for the demand for American "industrial know-how," according to Ivan A. Kazine, Industrial Economy Division, Bureau of Foreign and Domestic Commerce, under whose direction the list of technicians is being prepared.

Basing Points On Stainless Steel Prod

INGOTS-BLOOMS	SLABS	FORGING BILLETS	BARS	DRAWN WIRE (½-in. & Smaller)	SHEETS
Pittsburgh	Pittsburgh	Pittsburgh	Pittsburgh	Pittsburgh	Pittsburgh
Chicago	Chicago	Chicago	Chicago	Cleveland	Chicago†
Ft. Wayne, Ind.	Canton, O.	Ft. Wayne, Ind.	Ft. Wayne, Ind.	Dunkirk, N. Y.	Canton, O.
Canton, O.	Baltimore	Canton, O.	Canton, O.	Syracuse, N. Y.	Baltimore
Baltimore	Philadelphia	Baltimore	Dunkirk, N. Y.	Baltimore	Middletown,
Reading, Pa.	Reading, Pa.	Philadelphia	Watervliet, N. Y.	Reading, Pa.	.....
Philadelphia	.....	Reading, Pa.	Syracuse, N. Y.	Newark, N. J.	.....
.....	.....	Dunkirk, N. Y.	Reading, Pa.	Philadelphia	.....
.....	.....	Watervliet, N. Y.	Baltimore	Canton, O.	.....
.....	.....	Syracuse, N. Y.	Bethlehem, Pa.	.....	.....
.....	.....	Newark, N. J.	Newark, N. J.	.....	.....
.....	.....	.....	Philadelphia	.....	†Up to 48 in. w
.....	.....	.....	Cleveland*	.....	cold rolled onl
			*Cold-finished.		and Nos. 1 and finishes only.

More Moves Indicated in Steel Basing Point System Adjustment

Additional basing points reported about to be set up by tool steel manufacturers, number being increased from four to more than dozen. Step would be somewhat similar to that recently taken by stainless steel producers

NOT MUCH is being said about it, but signs are increasing to indicate steel sales executives not only are doing a lot of thinking these days about the basing point system of pricing but are making changes in the system which are certain to have far-reaching effect on the market as time passes.

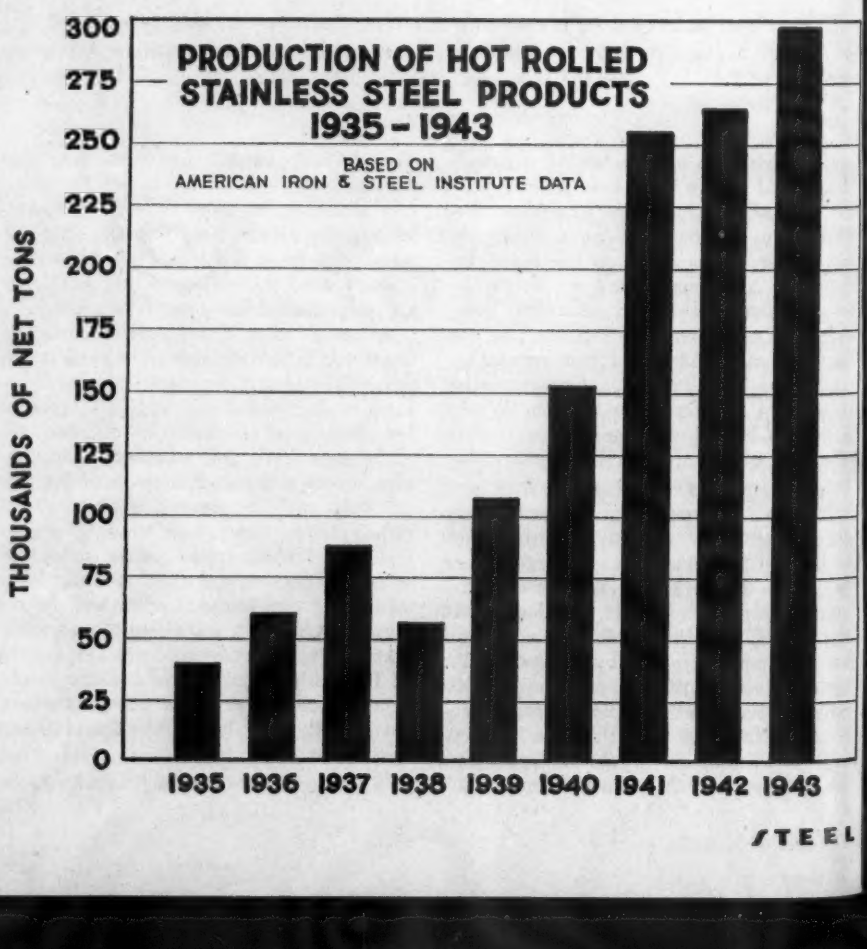
Only recently stainless steel producers abandoned the single basing point, almost over night adopting the multiple basing point system. Now the tool steel producers are reported considering somewhat similar action. In fact, extension of multiple basing from the present four bases to more than a dozen is reported imminent in tool steel circles.

At least one producer of tool steel last week was reported about ready to announce adoption of his mill producing point as a base, and establishment by other producers of their mill points as price bases is believed only a matter of weeks at most.

Until recently tool steel was sold on three bases: Pittsburgh, Bethlehem, Pa., and Syracuse, N. Y. Early in September, however, the Steel & Tube Division, Timken Roller Bearing Co., Canton, O., announced establishment of Canton as a base on all tool steel products which it produced, this announcement coming simultaneously with the one establishing Canton as a base on stainless steel products.

Action in the tool steel market, if taken, will stem from action of the United States Supreme Court (STEEL, April 30) in holding that certain basing point practices were in violation of the Robinson-Patman Act. This decision was made in a corn products refining industry case. Establishment of additional basing points on stainless steel and no probably on tool steel is seen as an effo to refine steel pricing practice to th end that action by Federal Trade Com mission to force further changes in ste policy may be averted. It is not cer tain, however, if the addition of basin points is the complete answer to th Supreme Court's position.

In the case of stainless steel, adoptio of multiple basing points effected a radical change in the marketing of these products since prior to the action sale were made only on a single basing point Pittsburgh. Extension of multiple bas ing to stainless products has had th effect of lowering delivered prices t consumers in many directions since so



Established by Leading Producers

PLATES	HOT-ROLLED STRIP	COLD-ROLLED STRIP	COLD-ROLLED FLAT WIRE	STRUCTURAL SHAPES	SEAMLESS TUBES
sburgh	Pittsburgh	Pittsburgh	Cleveland	Pittsburgh††	Pittsburgh
nton, O.	Chicago	Youngstown	Baltimore	Chicago	Chicago
ddletown, O.	Youngstown, O.	Canton, O.	Reading, Pa.	.....	Canton, O.
timore‡	Canton, O.	Cleveland	Dunkirk, N. Y.	.....	.....
.....	Reading, Pa.§	Reading, Pa.**	Canton, O.	.....	.....
.....	.....	Newark, N. J.††	.....	.....	.....
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aximum sizes 72-in. 56 in., up to ⅝ thick.

§Maximum width, 6 in.

**Maximum width 8 in.
††Maximum width 3 in.

††Equal leg angles up to 3 in. x 3 in. inclusive.

alled "phantom" freight from Pittsburgh to point of delivery no longer is harged, the freight applying to sales ow being that from basing point nearest onsuming plant.

Steel market observers are watching evelopments in stainless steel with particular interest. Stainless is one area f production which has experienced sensational advances quantitatively in recent years. Only a few years ago a elatively minor product from the standpoint of tonnage, stainless today is rapidly assuming major standing. Production of hot-rolled stainless steel products as increased from a little more than 1,000 tons in 1935 to around 300,000 ons in 1943. That is an increase of nore than 700 per cent in a period of ine years, and the market has only been scratched. Lower prices, it is held, will open market potentialities for stainless undreamed of in past years.

Lower delivered prices as a result of adoption of the multiple basing point system may be the beginning of a trend to a price level which will make stainless more competitive with other grades of steel and other products. Substantial increases in use are reported awaiting the metal in many outlets, especially in building construction, as a price level is attained which makes its use economically feasible.

OPA Revises Steel Castings Pricing Provisions

Producers of steel castings and railroad specialties have been authorized by the Office of Price Administration to deliver or agree to deliver these commodities at prices that may be adjusted upward if increases over present ceilings are subsequently permitted by the price agency. Pending final action by OPA on the industry's request for an increase in ceiling prices, producers may not receive nor buyers pay any amount in excess of the established ceilings.

OPA Recommends Immediate Steel Price Raise Averaging $2 Per Ton

Increase would not be across-the-board, some products not being affected. Proposed changes in extras taken into account. Further relief to be necessary. Suspension of stainless steel price control becomes effective Oct. 16

THE OFFICE of War Mobilization and Reconversion is considering action on an Office of Price Administration recommendation calling for immediate price relief to the steel industry which would average about $2 a ton on finished products.

This would not be an across-the-board increase since some base prices would not be changed whereas others would be increased by several dollars.

The $2 recommended average increase takes into account a number of proposed changes in extras which have been found to be out of line with costs.

It is expected that the recommended increases will be approved shortly. However, this is not the full amount of the price relief the steel industry can expect to get. As a matter of fact this $2 average increase is not expected to do any more than bring the steel industry to the break-even point in costs on the basis of the current rate of production and with the prevailing production mix.

Another upward adjustment will be needed later on to provide the steel industry a profit. Indications are this further adjustment probably will be deferred until such time as the pending wage controversy is settled.

A significant development in the steel market pricewise last week was the suspension by OPA of price control on stainless steel products. Effective Oct. 16 controls both at the mill and the warehouse level will be lifted.

This is the first move toward restoration of a free market in steel taken so far by OPA. It does not mean, however, that government price authority is being removed entirely since OPA will keep the stainless market under close observation to see how it reacts to the lifting of government controls.

Steel Corp. Shipments Off Further in September

Shipments of finished steel by the United States Steel Corp. in September totaled 1,321,576 net tons, a decrease of 10,604 tons from August shipments of 1,332,180 tons. For three quarters total shipments were 14,387,709 tons, compared with 15,864,466 tons in the comparable period last year.

(Inter-company shipments not included)
Net Tons

	1945	1944	1943	1942
Jan.	1,569,115	1,730,787	1,658,992	1,738,893
Feb.	1,562,488	1,755,772	1,691,592	1,616,587
Mar.	1,869,642	1,874,795	1,772,397	1,780,938
Apr.	1,722,845	1,756,797	1,630,828	1,758,894
May	1,797,987	1,776,934	1,706,543	1,834,127
June	1,602,882	1,737,769	1,552,663	1,774,068
July	1,608,994	1,754,525	1,660,762	1,765,719
Aug.	1,332,180	1,743,485	1,704,289	1,788,690
Sept.	1,321,576	1,733,602	1,664,577	1,703,570
Oct.	.....	1,771,969	1,791,938	1,787,501
Nov.	.....	1,743,733	1,660,594	1,665,545
Dec.	.....	1,767,600	1,719,624	1,849,635
Total	.....	21,150,788	20,244,830	21,064,157
Adjustment	.....	*98,609	*97,214	*449,020
Total	.....	21,052,179	20,147,616	20,615,137

*Decrease.

Scientists Laud Incentive System

Senate committees warned nation may lose leadership in scientific research if pioneering spirit is discouraged. Political control feared

SENATORS who are trying to reach agreement on the phraseology of a law to supervise and encourage scientific research were warned last week that continuation of the trend which has been undermining the American incentive system will cause the nation to lose its leadership in this field within a comparatively few years.

Leading scientists told them, at the opening of a series of hearings held jointly by the War Mobilization Subcommittee of the Senate Military Affairs Committee and two subcommittees of the Senate Commerce Committee, that much more besides government funds is needed to underwrite a successful scientific research program in the future.

"I believe Russia is planning to embark on a program of scientific research and development greater than that contemplated by any other government," said Dr. Irving Langmuir, associate director, General Electric Research Laboratories, Schenectady, N. Y.

In Russia, he said, the government does not hesitate to revise its communistic system by introducing the best features of our capitalistic system. Rates of pay, he said, are determined not by a man's needs but by his service to the state.

"It is continually pointed out by the Russians," said Dr. Langmuir, "that their system of incentives brings efficiency and is thus one of the main factors that will help to make Russia great and will make possible a higher standard of living. They not only pay industrial workers by piecework rates but they have especially high piece-work rates when a man exceeds his quota. Various types of incentives are offered to scientists.

"As an illustration of planning in science, Dr. Joffe, head of the Physical Institute in Leningrad told us that in May, 1930, he and his colleagues became convinced that 'it was essential to begin work on the atomic nucleus. We were all worried because it was the middle of the year and the appropriations for our work had already been made.' Although the new researches would require an expenditure of several hundred thousand rubles, Joffe was able in 10 minutes to get the chairman of the Supreme Council of the National Economy to agree to the extra appropriation. 'Once started,' Joffe told us, 'we have continued work on the atomic nucleus for 15 years as an essential part of our plan.' "

Contrasted with the Russian policy of frankly incorporating into their communistic government the best features of our capitalistic system, continued Dr. Langmuir, "we are tending to put into our democracy some of the worst features of communism which are now discarded in Russia. The pioneering spirit in the United States shows signs of dying out; we now talk about a 30-hour week—the right to a job. We attach too much importance to security and too little to opportunity."

Dr. Langmuir condemned the patent provisions of the Kilgore-Johnson-Pepper bill (S. 1297) which would put all ownership of the results of research in the hands of the government, if any small part of the cost of the research was paid for by the government. This stipulation would in most cases, he said, "make it impossible for the government to get industrial laboratories to accept contracts for such work. The reason that leads the government to desire contracts for projects of this kind is a need to develop some device of importance in national defense. If the government were to receive all rights for Army and Navy purposes and leave all commercial rights with the industrial laboratory, the government's interest would be protected.

"Consider, for example, a case in which an industry has already made great contributions in the development of special steels for jet propulsion turbines that will operate at the exceptionally high temperatures and stresses needed in these devices. Suppose now the laboratory undertakes to do work on a contract with the proposed National Research Foundation and that in the course of this work a new and greatly improved steel is developed that results in revolutionary improvements. According to the Kilgore bill (S. 1297) the commercial rights for using this alloy for, let us say, a locomotive which uses a gas turbine, would pass to the government, and all competitors of the contracting company would have free use of the improvement."

There are some cases in which patent rights should go to the government, such as those involving atomic energy but, Dr. Langmuir went on, the Kilgore bill attempts to prejudge all cases.

Dr. Langmuir also objected to the Kilgore bill because "it aims at an essentially political control of science. A

ANOTHER SECRET WEAPON: Wakeless torpedoes that sped silently and untraceably through enemy waters to blast her shipping played an important role in the defeat of Japan. Developed and built by Westinghouse Electric Corp., Pittsburgh, the projectiles were standard submarine equipment for a year before V-J Day. This photo shows how coils were installed in the motor of the torpedo. NEA photo

science program to be efficient must be planned by scientists." He preferred the Magnuson bill (S. 1285) which would give scientists more authority over the program and which also would allow the proposed National Research Foundation to include a patent clause in the contract when such a policy was considered fair to the government and the contractor.

Dr. Isaiah Bowman, president, Johns Hopkins University, Baltimore, deplored the proposed entry of the government in a field which always has been financed largely out of private funds in the past.

He also expressed opposition to central, overall direction of scientific research in the United States. He urged the senators to remember that "it was free enterprise in our laboratories, with support for special exploratory projects chiefly from private purses and foundations, that enabled us to train personnel and have it ready to the extent that it was ready for the emergency of 1941.

Appearing as president of the American Association for the Advancement of Science, Dr. C. F. Kettering, vice president, General Motors Corp. and head of its research division, declared that he favors the proposal under which the government would establish a National Research Foundation.

"But," he declared, "I do not think such action is a necessity by any means. I believe that research will be continued by private interests."

Proper Balance Necessary

Just as it is hard to get results with too little laboratory equipment and personnel, said Dr. Kettering, so it is hard to get them with an excess amount of facilities and personnel; when your facilities get too large your personnel becomes more interested in the facilities than in the objectives on which they are to be employed. Such fundamental matters must be determined by scientists. Then, basic scientific research has to be 15 to 20 years ahead of the needs of industry—and even a scientist does not know exactly what the needs of industry will be in 15 or 20 years, he said.

Dr. Kettering would not agree with the views of some other scientists that scientific research was lagging in the United States as compared with the rest of the world prior to the war.

Under no circumstances, said Dr. Kettering, should the proposed National Research Foundation attempt to interfere with the freedom of individual scientists and scientific institutions. This thought also was expressed by Dr. F. R. Moulton and Dr. Howard A. Meyerhoff, permanent secretary, and executive secretary, respectively, of the American Association for the Advancement of Science.

Dr. Harlow Shapley, director of the Harvard astronomical observatories in Massachusetts, in Colorado and in South Africa, warned the senators against any attempt on the part of the Congress to lay down specifications for research work to be done in the country.

Gray Iron Founders Key Convention Program To Price, Manpower Problems

Sen. Alexander Wiley of Wisconsin, Col. John Lansdale, who was the Army's chief of security and domestic and foreign intelligence on the atomic bomb project, Brig. Gen. D. Armstrong, commandant of the Army Industrial College, and Howard Taylor, Naval Research Laboratory, will be among speakers at the seventeenth annual convention of the Gray Iron Founders' Society at LaSalle Hotel, Chicago, Oct. 23-24.

Much of the program is keyed for a discussion of the gray iron industry's problems of inadequate manpower and "unrealistic" price ceilings.

The meeting will also devote attention to plant "conditioning," industrial relations, research, veteran placement and rehabilitation, production control for cost reduction, cost determination, quality control, and other topics.

A feature will be presentation by the society of its "Certificate of Appreciation" awards to six individuals "for distinguished service to government and the gray iron foundry industry." They are Edward P. Buchanan, Pittsburgh Coke & Chemical Co., Pittsburgh; A. Douglas Hannah, chief, Forgings & Castings Branch, Steel Division, War Production Board; Edward C. Hoenicke, assistant to the general manager, Foundry Division, Eaton Mfg. Co., Detroit; William Kerber, assistant to the president, Hanna Furnace Corp., Buffalo; Frank G. Steinebach, editor, *The Foundry*, and Donald J. Reese, head of Iron and Nonferrous Castings Sections, Development and Research Division, International Nickel Co. Inc., New York.

In an off-the-record talk at the Tuesday luncheon session Colonel Lansdale will reveal how the secret of the atomic bomb was so effectively guarded.

With W. O. Leonard, president of the Wilson Foundry & Machine Co., Pontiac, as panel chairman, the Tuesday afternoon session will give attention to industrial relations.

After hearing committee reports, the Wednesday afternoon session will consider OPA's new ceiling prices on gray iron castings. This session will also elect six new directors and study proposed revisions in the by-laws of the society.

Nominees for the board posts are A. R. Enquist, Connecticut Foundry Co., Rockyhill, Conn.; H. S. Faust, Hansdell-Elcock Co., Chicago; E. C. Hoenicke, Eaton Mfg. Co., Detroit; J. O Jackson, Jackson Industries Inc., Birmingham; C. R. McGrail, Texalloy Foundry Co., San Antonio; C. T. Milles, C. H. Milles Foundry Co., Chicago, and E. B. Smith, American Brake Shoe Co., New York.

Wire Association Meets At Chicago Oct. 15-18

The annual meeting of the Wire Association will be held at the LaSalle Hotel, Chicago, Oct. 15-18. Thirteen technical papers will be presented at the various morning and afternoon sessions.

TRANSITION TOPICS

STEEL EXPORTS— Heavy domestic demand for steel to limit shipments on foreign account for months to come. Large producers holding export quotas to 10 per cent of total tonnage while smaller steel companies are showing little interest in foreign inquiry. See page 86.

BASING POINT PRICING— Signs point to further revamping of steel pricing practices. Action of stainless steel producers in setting up multiple basing points reported being followed by producers of tool steel. Moves hold great significance for future steel marketing. See page 88.

SCIENTIFIC RESEARCH— Hearings before Senate committees developing views with respect to government participation in scientific research programs. See page 90.

INDUSTRIAL CHINA— Development program which may make China one of America's best customers being pushed. Five-year plan calls for construction of hundreds of plants, including three steel mills with capacity of 2,900,000 tons. See page 95.

METAL FINISHES— Designers of future metal products are given opportunity to study merits of numerous improved coatings—ceramic, metallic, lacquers, etc.—by reviewing work of the Electrochemical Society. See page 116.

TOOLING TRENDS— Those who think ultimate peaks in tool development and machine tool design were reached under wartime stimulus would be confounded by ambitious planning outlined by ASME members seeking further refinements. See page 121.

Economy Ax May Cut Off Many Government Pilot Plant Programs

Bureau of Mines may be compelled to terminate mineral exploration work and program for developing processes for production of metals from low grade ores. Work on some projects ordered tentatively stopped by Nov. 1

IF AN economy move now under way in the House is carried to conclusion, it will bring an early end to important exploratory and pilot plant work of the Bureau of Mines. The Deficiency Subcommittee of the House Appropriations Committee has instructed the bureau to report on how much of the money it received under special wartime appropriations still is unexpended. The purpose is to have this money returned to the Treasury Department.

Before a final decision can be reached, it will be necessary for the full committee to approve the recommendation. After that the House will have to act. Next it will have to be acted on by the Senate, and it finally will have to be approved by the President. The indications are that the proposed move will go through, for not only is Congress economy minded, but the President recently included Interior as one of the government departments that should have less money to spend in the future.

So Bureau of Mines heads are taking no chances on committing themselves to spend more funds than they may have available, and they have ordered tentatively the discontinuance and liquidation of many programs no later than Nov. 1.

If these orders are forced to become effective—and all present indications are that they will become effective—the result will be the termination of:

1—All exploratory work to locate new mineral deposits in the United States and its territories, and,

2—All pilot plant work to develop processes for producing the various metals from low-grade ores.

The exploratory work already has been cut in half as a result of a reduction in the appropriation for the Bureau of Mines for the year beginning July 1, 1945. The bureau has some 65 exploratory programs scheduled for the present fiscal year as compared with 125 in the previous fiscal year. With this reduction the bureau so far has been able to keep intact a staff of field men experienced in exploratory work. Complete discontinuance of the work would force all these men off the bureau's payroll.

Important pilot plant projects tentatively ordered to be shut down no later than Nov. 1 of this year include:

A rotary kiln sponge iron plant at Laramie, Wyo., which is being devoted to the study of utilization of western iron ores, particularly low-grade ores, and which has capacity for producing up to 50 tons of sponge iron daily with various types of fuel;

A sponge iron pilot plant at Salisburg, N. C., using brick kilns;

A ductile titanium pilot plant at Boulder City, Nev., which has been experimenting with the pressing of titanium powder into solid shapes to be drawn or rolled into wire, bars, etc.;

An electrolytic manganese pilot plant at Boulder City, Nev.; this plant is producing electrolytic manganese and shipping it to various companies for trial use in production of steel and nonferrous alloys;

An alloy steel pilot plant, now being completed at Redding, Calif., and about ready to be placed in operation;

Pilot plants at Salt Lake City, Utah, Boulder City, Nev., College Park, Md. and Norris, Tenn., which are working on processes for producing alumina from low-grade domestic ores and clays;

An electrochromium pilot plant at Boulder City, Nev., engaged in experiments to develop a process for producing electrolytic chromium for use by the steel industry instead of ferrochromium.

Program Started in 1939

The exploratory and pilot plant work was inaugurated by the bureau in 1939 when it received a small appropriation from Congress to find new domestic deposits of strategic minerals needed in the defense program. Later it received additional appropriations for the same purpose. Altogether it has spent some $30 million on exploratory work, and on the whole the results from this expenditure have been impressive.

With this $30 million spent over six fiscal years ending in 1945, the bureau examined some 6000 individual mineral prospects and explored 500. Many of these mines were worked during the war—a few to exhaustion. The larger portion of the minerals proven remains available for future use. Most of it entails costs too high to meet current prices on metals. However, the deposits found as a result of the expenditure of $30 million now are known and are ready for use when necessary in some future time of emergency. Bureau officials say a lot more exploratory work remains to be done before the country's complete inventory of minerals is known; they are convinced that vast quantities of minerals remain to be uncovered.

Exploration of these 500 deposits yielded these results:

Of several hundred chromite showings that were examined, 20 that were explored disclosed reserves of 9,127,000 tons of which 5,370,000 tons contained 19 to 25 or more per cent chromic oxide.

Of many hundreds of iron ore showings that were examined, 53 located in 26

HURRY TERMINATION: A group of Navy men, headed by W. John Kenney, are touring leading production centers to confer with district officials in an attempt to speed up Navy contract termination. Shown above are Capt. R. T. Hanson, director of Naval Materiel Inspection at Cleveland; Mr. Kenney; and Rear Adm. Harry L. Merring, chief of the Navy Industrial Readjustment Branch. NEA photo

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD

It is reported that . . . . . .

The National Research Council is compiling a directory of industrial research laboratories of which there were 2,264 in 1940 when the last listing was made.

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Said to be the largest government-owned plant yet leased for civilian use, a 21 million dollar factory is being converted for the making of streamlined trains. *Edward G. Budd, Philadelphia.*

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Experimental track-type tractors are using rubber tracks quite similar to those used on children's toys. *B. F. Goodrich.*

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A new technique, using an electric arc, makes it possible to cut industrial diamonds four times faster than the conventional method. *National Bureau of Standards.*

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An aviation magazine estimates that American domestic and international air carriers will put almost $750,000,000 in equipment in the next five years. *Aviation News.*

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A unique type of power transmission, which is positive and yet prevents gear breakage in case of jamming, uses metal gears meshed with gears of an elastic vinyl resin. *Resistoflex Corp.*

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Tooling has begun for the production of a calculating machine that automatically figures dividends, hourly pay rolls, writes checks and keeps records at 4,000 per hour speed. *Addresso-Multigraph Corp.*

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A dry cell developed for the Army is reported to have 5 times the shelf life of ordinary batteries. A 93.6 volt radio battery of 72 cells weighs only 2 pounds. *Engineering & Mining Journal.*

An oxy-acetylene cutting unit developed by the Navy can be carried on the operator's back and used without setting it down.

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One of our admirals reports that welded ships have proved to be stronger than riveted ones during the war. *Admiral Emory S. Land.*

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The American optical industry is now producing, by automatic, mass production methods, lenses superior to those formerly made by hand in Germany.

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The Army has been using a very compact radio communication system that can carry facsimile pictures, telephone conversation and teletype messages all at once.

A new pocket-size instrument reports power output and efficiency to the pilot of a plane by measuring constantly the deflection of the engine under the force of explosions. *Consolidated-Vultee.*

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Claims for a new rubber cement include adhesion to metals, plastics and ceramics; shear strength of 3,250 pounds per square inch and tension strength of two tons. *B. F. Goodrich, "Plastilock"*

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The first section of the Society of Automotive Engineers to be established outside continental United States has been organized in the Hawaiian Islands.

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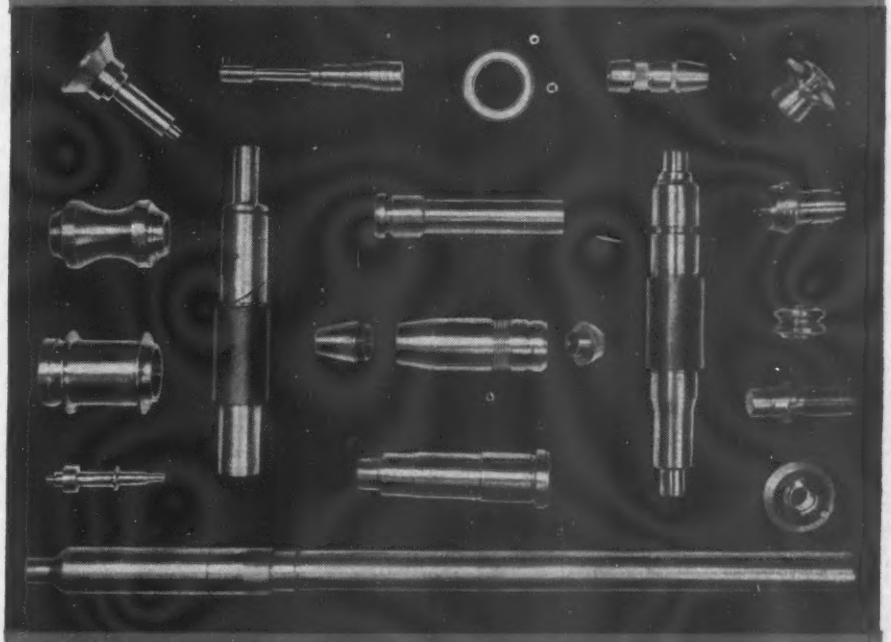
A new electrical device analyzes the composition of metal and indicates its maximum endurance. *Electrical Manufacturers Public Information Center.*

get ready with CONE for tomorrow

A new stainless steel is soft and ductile enough to be formed and fabricated like aluminum. *Rustless Iron & Steel Corp., Baltimore.*

Keep ahead with production savings from parts produced on the 8-Spindle Conomatic.



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U. S. A.

22

states disclosed 155 million tons of iron ore; this total included 37 millions containing 50 per cent or more iron and 100 million tons containing 40 per cent or more iron.

Of some 1000 manganese showings, 46 that were explored disclosed 26,528,000 tons averaging 12 per cent manganese, 10,000,000 tons containing 3.5 per cent and 10,000,0000 tons containing 0.2 per cent.

Some 500,000 tons of fluorspar were blocked out in 13 deposits.

Low-grade nickel ore, containing 1 to less than 0.5 per cent nickel, was found in the amount of 21,000,000 tons.

About 1,100,000 tons of ore found contain about 0.6 per cent cobalt and 1 to 1.5 per cent copper.

Four exploration projects were found to contain about 2,500,000 tons of low-grade molybdenum ore.

Four explorations disclosed more than 20,000,000 tons of ore averaging about 1 per cent vanadium.

Commercial ore containing 37,400 flasks of mercury, and marginal ore containing 29,200 flasks, were found in 13 deposits.

Other discoveries included enough low-grade antimony ore to produce about 41,500 tons of metallic antimony; enough tin ore to produce some 2000 to 4000 tons of metallic tin; 1,165,000 tons of bauxite containing 40 per cent or more alumina; 4,500,000 tons of clay containing more than 35 per cent alumina; more than 500,000 tons of tungsten ore, etc.

Most spectacular discovery was that of the tungsten deposit at Yellow Pine, Idaho, which came at a time when tungsten was badly needed for the war program. The reserves there, containing about 800,000 units of tungsten trioxide, were mined out completely. Of the antimony ore, also found at Yellow Pine, Idaho, only a few thousand tons were mined during the war; the need was not sufficiently acute to warrant large-scale use of this low-grade ore to produce metallic antimony at excessive cost. The tin ore, uncovered in Alaska, continues unexploited for the simple reason that transportation difficulties prevented its utilization during the war. It is figured that tin produced from this ore would have cost about $1 per pound during the war.

FEA Continues Functions Until End of the Year

Although the Foreign Economic Administration has until Dec. 31 to liquidate its affairs and go out of business, business men who have had dealings with it should continue to address communications to the FEA about pending and new business the same as before.

Under the President's directive, the FEA functions are to be distributed to other government departments as follows:

Administration of lend-lease, procurement under the United Nations Relief and Rehabilitation Administration program, and purchases of machinery and other goods for foreign governments, are to be transferred to the State Department.

The Rubber Development Corp., Petroleum Reserves Corp., and the United States Commercial Co., along with procurement of strategic commodities abroad, will be transferred to the Reconstruction Finance Corp.

Export control, the technical industrial intelligence committee working under the United States joint chiefs of staff, the facilitation of trade, and the functions of the clearing house for foreign transactions and reports will go to the Commerce Department.

All FEA activities involving food, food machinery and other food facilities for foreign countries will go to the Agricultural Department.

To unify disposition of United States property abroad, the President's order designated the State Department as the disposal agency for all surplus property, excepting certain ships, now held in foreign areas. This directive also includ disposal of property captured from e emy countries.

Rapid Progress Reported In Settling Contracts

Rapid progress is being made by t procurement agencies in settling ter nated contracts. Claims involving so $24 billion have been settled. Pendi claims involve terminated contracts co ing to about $36 billion. The lat figure will be upped to around $41 b lion in the next few months by reason two factors: Additional contracts are d for early termination, and quite a fe contractors still delay putting in the claims.

Most claims continue to be settled o a no-cost basis, so that the cost to t government of settling the $36 billi of pending negotiations is expected range between $3.5 and $4 billion. Offi of Contract Settlement spokesmen b lieve that fully 75 per cent of the pend ing claims will have been settled by De 31. The remaining 25 per cent w have been settled by mid-1946.

Answer To Nation's Future Oil Needs Lies In Technology, Expert Tells Senate Group

DESPITE the widely held fears the nation's petroleum reserves were headed for early depletion as a result of unprecedented demands for purposes of war, expert opinions voiced before the O'Mahoney Special Senate Committee Investigating Petroleum Resources have been on the optimistic side.

This was particularly true when one of the oil industry's most highly respected leaders, Dr. Robert E. Wilson, reported to the committee. Dr. Wilson, chairman of the board, Standard Oil Co. of Indiana, has been chairman throughout the war of the Petroleum Economics Committee of the Petroleum Industry War Council. He also was chairman of a special industry committee organized to prepare estimates of future petroleum requirements for the O'Mahoney committee. Dr. Wilson declared that the basic answer to the country's future oil needs lies in technology and free enterprise rather than in the new high total of more than 20 billions of barrels of proven reserves in the ground.

"Technology is the indispensable finder, developer, and multiplier of our natural resources and, given a fair chance, will accomplish even more in the future than it has in the past," Dr. Wilson said.

"The most essential element of national oil policy is to leave the industry free to develop on a tried and proven basis, and shun the adoption of measures which would attempt to regiment research, destroy the incentives to invention, or prevent the free play of competitive enterprise."

In spite of repeated and widely circulated "scare stories" during the last 2 years predicting an imminent shortage of oil, the American petroleum industry, operating freely and competitively, has never failed to meet the public requirements, he said.

In the period 1961 to 1965 about three-quarters of a million more barrels of petroleum will be required every day than in 1944, or 2,000,000 barrels above prewar levels.

"The industry," he said, "knows a dozen ways in which any possible demand can be met, even though it cannot predict just which of these methods will prove most efficient and economically desirable when the time comes."

Dr. Wilson advocated an import policy which will permit needs to be met at reasonable prices and yet not flood the market or keep prices at a level which would discourage an adequate amount of exploration, wildcatting, and secondary recovery activities.

Deficiencies could also be met by improving techniques already known for getting petroleum products from natural gas, oil shale and coal. Coal deposits alone, he said, could supply abundant liquid fuel for more than a thousand years, but it is "quite possible" that even before petroleum deposits are exhausted still other and cheaper sources of power will be developed.

Development Program May Make China Good Customer for American Goods

ALEX TAUB

Five-year plan calls for construction of 953 plants, including power generating units, agricultural development and marketing units and "production establishments." Three new steel plants planned, bringing country's capacity to 2,900,000 tons

DR. WONG WEN HOA

LARGE business potentialities for American industry will be disclosed soon —probably within the next couple of months—as a result of intensified action to crystallize plans for the industrialization of China.

During the war American and Chinese engineers and economists gave much thought to such plans to promote Chinese production for purposes of war. Subsequently the thinking and planning placed greater emphasis on the development of a healthy economy in China as part of the program to bring about stability in Asia and the whole western Pacific area in the postwar period.

The blueprint, as it now is taking form, makes it certain that China will be one of our best customers in the years to come. In particular, that country will buy large quantities of industrial machinery from the United States.

China is well organized to carry out her industrialization program. It is under the personal sponsorship of Dr. T. V. Soong, premier of China, and its details are in the hands of the National Resources Commission of China. Head of the commission is Dr. Wong Wen Hoa who, in addition to being recognized as a leading Chinese statesman, is an outstanding geologist and economist. Dr. Wong also serves as minister of economic affairs, and as chairman of China's War Production Board.

To facilitate contacts between government officials and private interests in China, on the one hand, and the United States government and American technologists, on the other, the National Resources Commission of China maintains a technical office at 111 Broadway, New York, with Dr. S. C. Wang as director, L. F. Chen as deputy director, and Dr. K. C. Sun as economist. Supplementing these officials is a large staff of Chinese technologists and business and professional men thoroughly familiar with conditions in all districts of their great homeland.

Purchases of United States equipment will be in the hands of the Chinese Supply Mission, 2311 Massachusetts Ave., N. W., Washington. So that this organization will function smoothly, plans are now under way to staff it largely with Americans who know American industry and have had years of experience in dealing with it.

Working closely with the Technical Office of the National Resources Commission of China in planning and organization work is the consulting engineering firm of Alex Taub Associates, Washington. This is a group of former key men in the Foreign Economic Administration's technological organization. Mr. Taub served FEA as its chief engineer and, among other activities, he was a member of the group of American production men and engineers headed by Donald M. Nelson which visited China last year to stimulate war production.

Internationally Known Designer

Mr. Taub is recognized internationally as a designer of automotive power plants. From 1912 to 1917 he worked as draftsman and designer for Packard Motor Car Co. After that he worked for a year as chief draftsman for Scripps Booth and then in the same capacity with Northway Motors; both these companies were absorbed by General Motors Corp. From 1926 to 1936 Mr. Taub was in charge of engine research and development for the Chevrolet Motor Co. In 1936 he assumed charge of engine research and production for Vauxhall Motors Ltd., British subsidiary of General Motors Corp. In England Mr. Taub served as a member of the Mechanization Board of the British Ministry of Supply, lectured on automotive engines at Oxford and Cambridge universities, and designed the famous Churchill tank engine. Subsequently Mr. Taub returned to the United States on a special mission for the British Air Ministry. Later he worked with the Office of Emergency Management and the Office of Production Management. In 1942 he went with the Board of Economic Warfare, since known as the Foreign Economic Administration, to organize and supervise its engineering service. He resigned this connection early this year to organize his new firm.

Associated with Mr. Taub are R. D. Lamie, formerly chief of the chemical division of FEA's Engineering Service; H. C. Cassell, formerly chief of production engineering section of FEA's Engineering Service; and W. S. Vaughan, formerly in charge of mining and metallurgy of FEA's Engineering Service. Mr. Vaughan also spent some time in Mexico to promote production in that country and later served as head of the Industry Subcommission of the Allied Control Commission in Italy which implemented the terms of the armistice with that country.

Master blueprint for the program is a report entitled "Guide to the Industrialization of China" which was prepared by FEA's Engineering Service under the direction of Mr. Taub. It represents largely American thinking on the problem of what sort of industries may be established in China, where they should be located, and how large they should be at the beginning. The report was submitted frankly as a "guide," since there was no intention to put the United States in the position of attempting to hand a ready-made program to China. However, the report has been the basis of official Chinese planning. Whereas the report set up a five-year industriali-

zation program, Chinese authorities came to the conclusion that China would do well not to bite off more than it could chew at one time. Hence the program is being frozen with modifications here and there, as a three-year endeavor.

The plan is predicated on the concept that industrialization of China must be a process of evolution. The first three-year period is to be devoted to establishing the groundwork only. But the program as laid down by the FEA is a bold one. The five-year plan calls for construction of 953 plant units—a program, Mr. Taub admits, that is "a large order for any country, and more difficult of execution perhaps for China than others." This total, set up by the FEA engineering staff for execution in five years, included 250 commercial power generating units, 120 agricultural development and marketing units and 583 "production establishments" embracing 170 under mining and metallurgy, 105 under chemical and basic processing, 192 under manufacturing and 116 under food processing.

The plan foresees that to industrialize on any sizable scale many diversified service activities will have to be provided, such as transportation, communications, education, housing, hospital and medical facilities, repair and maintenance, educational and many other facilities. It foresees that agriculture will continue to be the principal activity in China and must be maintained on a healthy basis. In particular, the plan recognizes China's existing industries and is designed to fit China's resources in materials and manpower.

Industrial Balance Sought

While 953 plant units sounds like a big program, says Mr. Taub, this number is the minimum considering the range of products to be made, and the resources to be developed as a result of their operation. It will be necessary at the outset to establish that many plants, he says, to provide the necessary framework for a proper industrial balance.

"But the output of each plant initially will be only a fraction of potential Chinese requirements," says Mr. Taub. "These will be 'seed' plants. They will provide experience and 'know-how' on which future expansion programs will be based. A major purpose in the planning of these plants is to utilize them for training purposes. While they will be operated for production, they at the same time will make it possible to train large numbers of Chinese workers to be absorbed in future programs of expansion."

At the outset, to finance a three-year plan, China proposes to borrow $2 billion in the United States. But that is considerably less than the expected outlay. China expects to revive and expand her export trade, with a portion of the proceeds to be earmarked for the industrialization program. The plan visualizes the industrialized China as a self-contained nation—and an impressive approach toward this condition, it is believed, can be made quickly by reviving export trade in certain products in which for years the Chinese have been firmly established.

EDWIN A. LOCKE JR.

Who is being sent to China to discuss that country's peacetime economic reconstruction and development with Generalissimo Chiang Kai-Shek. Mr. Locke is the President's personal representative to China, occupying the same position formerly held by Donald M. Nelson. NEA photo

Steel production in China is regarded by Mr. Taub as a "must."

"Steel," he says, "is the catalyst of industrialization. Given a quantity of vegetation, 50 tons of steel will convert it to alcohol, 100 tons of steel will convert it to butyl, 300 tons will convert it to gasoline and 1000 tons of steel will convert it to high-octane gasoline or synthetic rubber. Steel is the basis of growth in all countries, and it is our job to show those beyond our boundaries how to use it."

The three-year plan provides for construction of three steel plants, one to have capacity of 450,000 tons of ingots annually, and the other two to have capacities of 300,000 and 150,000 tons. Chinese authorities estimate that Manchuria now has annual capacity for producing about 1,000,000 tons of ingots. With the projected expansion, China would have capacity of about 1,900,000 tons, so that as the industrialization program unfolds large increases in capacity would be needed. The initial three-year program envisions installation of by-product coking ovens, and recovery of by-products for use in various phases of industrialization.

Under mines and metallurgy the plan contemplates development of new coal mines, not only for use by the iron and steel industry, but for operation of central power plants until such time as China carries out ambitious plans for hydro-electric power developments. Plants for production of ferrosilicon, ferrotungsten, refractory brick, cement, copper, aluminum, antimony, mercury, tin, lead and zinc are included.

The plan calls for nucleus production of a host of various chemicals needed for industrial and consumer purposes, but the emphasis is on production of the basic industrial chemicals. That is one of the important objectives tied in with the installation of by-product coke ovens at iron and steel plants; they are to be provided with complete by-product recovery plants. Other chemical raw materials whose production is a "must" include soda ash, sulphuric acid, chlorine, caustic soda, calcium carbide, etc.

The 192 projected manufacturing plants, Mr. Taub explains, are all more or less interrelated, in that they will serve each other in the manufacture of component parts and fabricated materials.

"Some plants for the production of highly technical and complicated items such as gages, bearings, electrical instruments, scientific apparatus, etc., have been deliberately left out of the initial program," he says, "due to the high degree of skill and knowledge necessary for their operation. These plants can be built through the operations of the included plants when the demand for the product is large enough to justify their low-cost operation, and when China has developed skill and 'know-how.'"

Manufacturing Plants Classified

These 192 plants—to cite only a few—are classified as follows: Electrical equipment 1; telephone and telegraph equipment 1; radio communications equipment 1; heavy industrial machines 2; small machine tools 3; large machine tools 1; industrial hand tools 1; general construction and mining equipment 3; steam engines 2; automotive manufacturing 1; small turbines 1; mechanized agricultural equipment 2; refrigeration equipment 1; textile mill equipment, spinning and weaving 5; railway car shops 3; locomotive shops 1; truck and bus shops 2; boiler manufacturing plants 3; steel barge and tug yards 3; iron foundries 1; steel foundries 3; screw machine products plants 6; metal stamping plants 6; jobbing machine shops 4; wire products plants 2; pipe and tube plants 2; structural fabricating shops 3; sheet metal work plants 4; nonferrous rolling mills 1; nonferrous foundries 4; electric wire and cable plants 2; metal container plants 3; plumbing fixture plants 2; flat glass plants 2; electrical devices plants 3; tanneries 7; cotton and wool spinning and weaving plants 16; cordage and twine plants 4; rubber goods plants 2; lamp bulb and tube plants 2; radio set plants 2; battery plants 3; bicycle plants 2; enamelware plants 4; clock and watch plants 2; sewing machine plants 2; porcelain ware and insulator plants 1.

Plants listed under agriculture and miscellany include canneries, meat processing plants, flour and rice mills, grain elevators, ice plants, refrigerated warehouses and others.

The plan contains numerous provisions to meet prevailing conditions in China. For example, "village industries" are

found normally all over China and ch industries provide much income to inese families and in the past have ured prominently in making goods for port. The three-year plan calls for rge-scale production by the village in- stries of all types of hand tools—both r industry and for agriculture.

One of the interesting features of the ree-year plan is that alcohol rather than soline will be the fuel for driving otor trucks and much other power appa- tus. By this move agricultural produc- on in China will be stimulated. The an is to produce not only alcohol but arious by-products. While the ability burn alcohol correctly must be learned China, Mr. Taub points out that much rogress has been made in the United tates of late to establish the technical ossibilities of alcohol as a fuel.

"The foreseeable power performance ith alcohol is approximately 26 per ent more than the present performance ith gasoline, assuming the compression atio of engine can be raised to suit alco- ol and other corrections in the engine re made, as has in the past been done to uit gasoline," says Mr. Taub.

"Engine manifolds can be readily changed to suit alcohol and obtain a fuel consumption approximating the present gasoline operation. Alcohol will promote less cylinder wear than gasoline."

After studying the tribulations of motor transport in China, and observing the condition of the roads in that country as they now exist, Mr. Taub believes that motor truck equipment must be specially designed for China.

"Present engines are too small and many of the important components are just undersized," he states. "Styled trucks soon shed their glory and considerable time is lost in patching sheet metal which has no utilitarian value. The slippery gumbo that flows with the rains makes a differential lock necessary. Further, an automotive industry in China must consider the use of its basic engine for a tractor, bus, water pump, marine use, and for roadbuilding equipment. The engine should be larger than the average American engine. When smaller units are needed, then a four-cylinder engine using interchangeable parts with the six-cylinder engines should be used. There also is a place for two-cycle engines for use in farm mechanization and for powering light Chinese junks."

Probably the single most important undertaking in the program is the development, to start as soon as possible, of the Kansu oil fields. The prospect is for production of approximately 20,000 barrels of petroleum products per day.

The foregoing constitutes only a rough outline of the program to be carried out under the immediate three-year plan. It includes many other projects, such as irrigation and river control, deep sea port development, launching of a national sanitation drive, rebuilding of railroads and construction of new lines, establishment of training courses in the public schools, organization of technological libraries, etc.

And yet, all parts of the program are to be undertaken on a scale which, while large for China, would be relatively small for the United States. For example, current Chinese needs for motor trucks are about equivalent to the capacity of 15,000 2½-ton trucks operating 100 miles per day and, allowing for industrialization and construction of roads and of maintenance and repair shops, it is estimated that the expected increase in requirements will require approximately only an additional 15,000 trucks a year.

Quonset Huts of Armed Services Become Civilian Commodity

QUONSET huts have become a civilian commodity and orders are being accepted from the public for the basic round-roofed steel structures the Navy used in World War II to shelter men and materials on an enormous scale. Coincidentally, Great Lakes Steel Corp.'s Stran-Steel Division has revealed approximately 154,000 Quonset structures were supplied the armed forces during the war. The space covered by this output from plants at Ecorse, Mich., Terre Haute, Ind., and Mansfield, O., is more than 195,715,520 square feet.

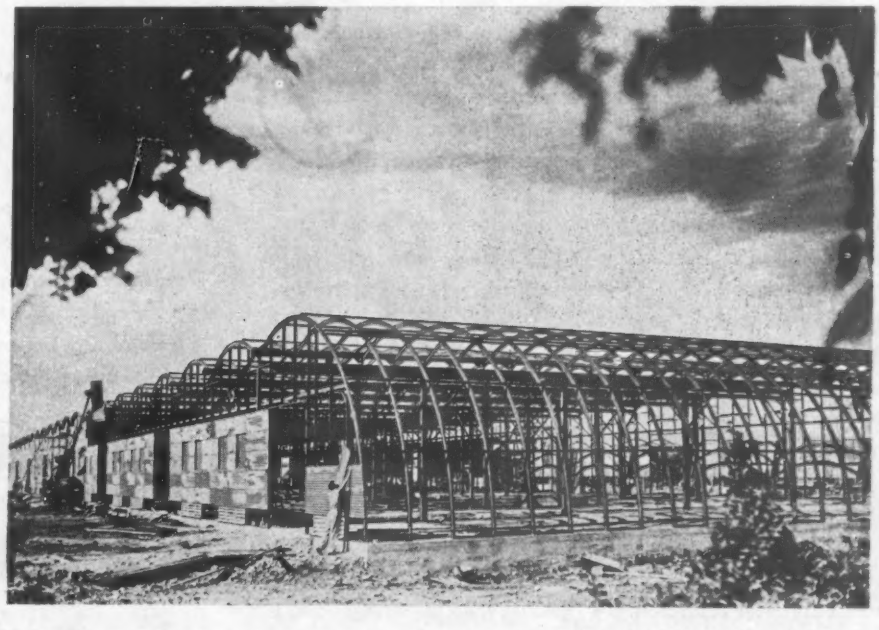
Quonsets are built of arch-ribbed, Stran-Steel framework, to which sheet metal is nailed. The framework is assembled by bolts and screws. Quonset uses ranged from headquarters office, barrack, hospital and chapel to dairy barn, machine shop, bank and school.

Production of the packaged buildings will be continued for industrial, farm and aviation purposes in the sizes most used by the Navy. Retail prices are approximately $900 for the basic Quonset 20, a 20 x 48 ft structure, and about $3000 for the Quonset 40, a 40 x 100-ft general-purpose building. Shorter or longer units in those widths and wider multi-arch structures may be purchased at proportionate price differences.

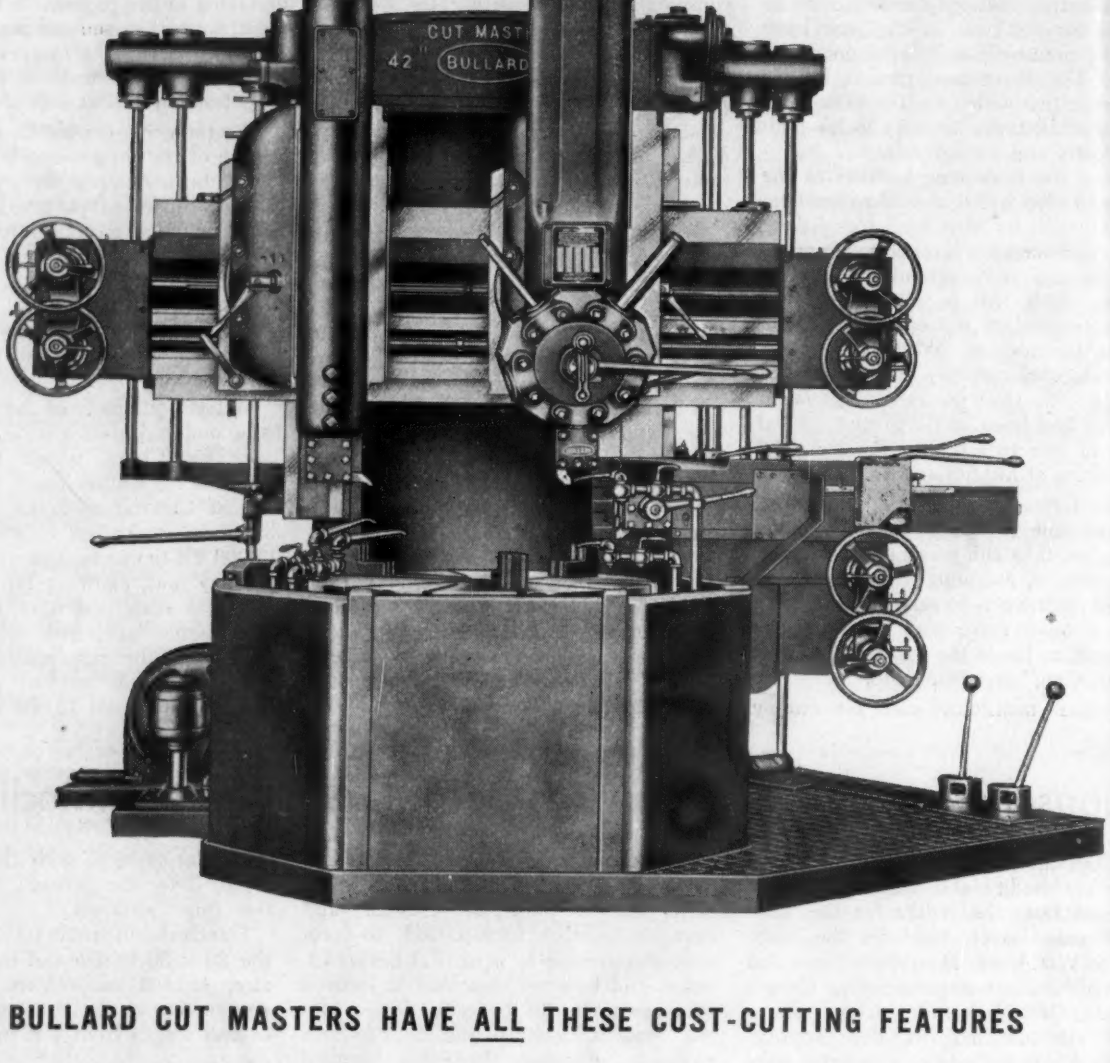
The structures will be marketed through the Stran-Steel Division offices at Detroit and dealers now being established elsewhere.

Fundamental units of the construction system are the Stran-Steel arch-rib and the Stran-Steel beam or floor stringer. Both members are formed from double strips of sheet steel, each strip being bent into a U-shaped channel and stamped together back-to-back to form a section similar to a small I-beam. Internal and external sheathing is secured to those arch ribs by nails driven into the grooves between the back-to-back channels. Plywood floors are installed in similar fashion, with the nails being driven into the grooves or valleys of the floor stringers.

Standard rib-spacing, including both the 20 x 56-ft size and the 40 x 100-ft size, is 4-ft on centers. Accordingly, structures can be erected having any overall length from 4 ft up to 400 ft or more.



This Stran-Steel Quonset structure, known to its Seabee builders as "Multiple Mae West," will shelter food to be consumed by sailors remaining on the job of policing Japan. This building on Guam will cover 54,000 sq ft. U. S. Navy photo



ONLY BULLARD CUT MASTERS HAVE ALL THESE COST-CUTTING FEATURES

Features that Cut Time on Cuts

1. On five sizes, 30″ up to and including 64″, the base and upright column is a massive integral casting for vibration-free sturdiness and rigidity. This permits heavy, accurate cutting. **2.** Swiveling main turret head and independent, non-swiveling side head for simultaneous heavy cutting without interference or lost time. **3.** Sixteen feeds for each head in geometrical progression from .0026 to .500 per spindle revolution . . . 20 table speeds . . . motor ratings 30 to 40 HP — *all* adequate for fast heavy cutting. **4.** Screw feed of main head for highest degree of machining accuracy under heavy feeds. **5.** The ideal combination of rigidity, sturdiness, freedom from vibration, smooth flow of power and wide range of speeds and feeds to take full advantage of the higher efficiency of the latest development in cutting tools.

Features that Cut Time between Cuts

6. Vertical construction that speeds chucking because it is easier to lay a piece down than to hang it up. **7.** Chucks designed to provide maximum jaw pressure with minimum wrench effort. **8.** Quick, easy adjustment of main rail to place turret close to work and eliminate excessive tool overhang. **9.** Rapid power traverse in any direction, accurately controlled to bring tools quickly, safely within a fraction of an inch of the work.

Compare Bullard Cut Master Vertical Turret Lathes' efficiency and economy with other machines of the same type. You'll find that only a Cut Master has the metal-removing ability and *all* the other features that *cut time on and between cuts* to the minimum. Cut Masters are available in 30″, 36″, 42″, 54″, 64″, and 74″ sizes. The Bullard Company, Bridgeport 2, Connecticut.

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BULLARD

CREATES *NEW METHODS*

TO MAKE MACHINES DO MORE

By A. H. ALLEN — Detroit Editor, STEEL

MIRRORS of MOTORDOM

Hopes that start may be made on 1946 automobile production flickers over Detroit as strikes subside—at least temporarily. Union's demand for 30 per cent increase in wage rates still unsettled. Strike votes asked at plants of major producers

DETROIT

FLICKERING over this stalled motor capital is a faint glimmer of hope that a good production start on 1946 passenger car models may now be under way, after six weeks of delay arising from chaotic labor conditions. For the first time in many weeks, major strikes and attendant layoffs, except for a bad one at Ford of Canada in Windsor, have eased. Kelsey-Hayes working forces are back in the plant and most Ford crews at the Rouge plant have been recalled. Striking foremen at Hudson have returned to their jobs on an unannounced basis, following efforts of the U. S. Conciliation Service to break this six-week impasse.

After any protracted tieup, it takes time to re-establish the tempo of manufacturing, to open the valves of the supply pipelines, to get conveyor lines rolling again. Thus, while production of one sort or another was slated to be under way last week at Ford, Hudson, Nash, Buick, Pontiac, Olds and perhaps Chevrolet (still the mystery member of the GM family), those units which have been in a state of suspended animation as a result of strikes probably made little headway. Supplies and components held in float are unbalanced, long on this and short on that.

Wage Demands Unsettled

Basically, nothing has been settled as far as labor's demand for a 30 per cent base wage boost figures in the picture, except that General Motors has refused it unconditionally. Meanwhile, formal requests for strike votes have been filed with NLRB covering plants of GM, Chrysler and Ford. Thirty days must elapse before such votes can be conducted, according to the Smith-Connally Act, but this is generally considered just a lot of hocus-pocus, for everyone knows that the actual vote means nothing, even one vote in favor being sufficient excuse for a strike.

Assuming the NLRB can locate sufficient funds to conduct the votes, which at this stage is by no means sure, they will be held the latter part of next month and by Dec. 1, if they are to come at all, strikes will begin. The feeling is being expressed in many quarters that working forces in general are cooling off somewhat in their fervor to walk off the job. Perhaps many, after cashing war bonds and watching savings dwindle, are realizing the war's gravy train has been pushed into the yards, making it a matter of necessity to stay on the job and pitch to avoid flat pocketbooks.

Clear, cold logic characterized General Motors' rejection of the UAW-CIO demands for "30 percent or else." Pointing to less than normal net profits during war years, the corporation said it cannot and will not use money saved up for many years for the purpose of modernizing and expanding its plants, and for providing more good jobs, to pay excess wages for work not performed. Neither will excess wages be paid currently from presumed future excess profits when a realistic forecast of costs shows there will be no such profits. Union demands were characterized as one of the three sources of a dangerous runaway inflation, the other two being wartime and current deficit spending of the government, and a pentup demand for goods and services now at the point where many are willing to pay excessive prices, even in black markets, to satisfy impatient desires.

Pointing out that fair consideration must be given not only to 400,000 employees, but also to 426,000 stockholders, 15,214 dealers and their employees, 10,000 subcontractors and their employees, and an estimated 10,000,000 potential customers, GM called for hard work, patience and understanding as guiding principles in the difficult task of postwar mopping-up and reconversion.

With incisive directness, the corporation threw this one at the UAW-CIO:

"While your union may have the power by coercion to close our plants and those of our suppliers without the approval of a majority of the workmen, it is not clear that your union can or will live up to its agreements. The sanctity of union agreements is in question at this time. While the strike record in General Motors during the war has been better than the average, it is not too good, and we have plants closed right now through unauthorized strikes in violation of agreements with the CIO."

It becomes increasingly apparent industrial peace and economic solvency are vitally dependent on mutual respect for union contracts and on some form of compulsory arbitration of disputes before they reach the strike stage. By their flagrant violations of contracts and utter disregard of the public interest, unions are driving both Congress and the public toward legislation which will plaster collectable fines on violators. The warning signals have been hoisted, the situation cannot go much further before action will become imperative.

The UAW-CIO response to GM's lengthy denial of its demands was weak

FIRST POSTWAR RUBBER: Forty-two tons of crude rubber, first shipped from the Pacific since Pearl Harbor, recently was landed at San Francisco from the Pathfinder plantation of the Goodyear Tire & Rubber Co. The rubber, property of the Rubber Development Corp., will be allocated to Goodyear processing

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CONGRATULATES SUCCESSOR: Long a topflight automotive sales figure, William E. Holler, right, is resigning as general sales manager of the Chevrolet Motor Division, General Motors Corp., and here congratulates Thomas H. Keating, left, who will assume the post Oct. 16

and can be reduced to two points:—First, it said the corporation's statement was "propaganda;" and second, it wants wage negotiations with the corporation thrown open to the press and the public.

There are grave doubts as to the sincerity of union officials and as to their even slight knowledge of basic economic principles. Here is a case which backs up this observation:

A number of small tool companies in this area were confronted with union demands for 52 hours' pay for 40 hours' work, and in reply offered the counter-proposal that such demands would be accepted, provided in return union members would guarantee the equivalent of 48 hours' productivity for 40 hours of work. In a couple of cases the company offer was accepted and work proceeded on the basis of 40 hours' time. Surprisingly enough, productivity or per man output rose not only by the 20 per cent asked by the managements, but as much as 25 and even 30 per cent.

Yet when international officers of the union heard about the deal, they shouted it down and instructed locals to accept no more such "nefarious" contracts which were nothing more than "a return to the old vicious speed-up."

What lies ahead for the automotive industry, now at the greatest transition stage in its 40-year history, will be discussed by C. E. Wilson, General Motors president, at the victory dinner Oct. 15 of the Automotive Council for War Production, now formally disbanded. Early plans for the celebration (or wake) indicated it would be a typically sumptuous affairs, with 1000 in a tendance, including scores of high-ranking government and military officials, as well as most of the top automotive officials.

Incidentally, the council's tooling information service, which during the war provided regular reports on the status of about 150 suppliers of tools, dies, gages, jigs, fixtures and special machinery and proved a valuable assistance to contractors seeking to locate such facilities, will be continued, under direction of the Automotive Tool & Die Manufacturers Association. Reports will be issued twice a month, starting Oct. 20. Further details can be obtained by addressing the association at 411 Boulevard Bldg., Detroit 2.

Manufacturing facilities of Detroit Gear and other divisions of Borg-Warner Corp. are being expanded to the tune of $12 million for manufacture of a new automatic transmission, first announced in these columns Aug. 27 as being a possible early feature of the Ford line of passenger cars. While it was assumed Ford engineers had a prominent part in developing the new unit, which provides four forward speeds and reverse with only seven gears, Borg-Warner spokesmen say it is the result of ten years' research and development by engineers of its Detroit Gear, Borg & Beck, and Long Manufacturing Divisions. Shifting from low gear through the four speeds to high gear required no manipulation nor attention from the driver, and when descending hills or slowing down in traffic, the downward shifts are also automatic. When the car is brought to a full stop the motor is entirely disengaged.

Kaizer and Frazer Tell Auto Building Plans

CLEVELAND

Wined and dined by Cyrus S. Eaton, local financier and one of three underwriters of the budding Kaiser-Frazer Corp., whose stock issue of $17 million was oversubscribed five times in the space of a few hours, Messrs. Frazer and Kaiser extemporized at length for the press here recently concerning some of their plans.

Among other chores in this city, the two studied a new automotive engine being developed by Jack & Heintz, remarking that it looked good but that they had no plans to use it in either of their proposed cars. They also scouted rumors of any plans they might have to use the Taylor engine developed on the West Coast for which Powel Crosley Jr. of Cincinnati has the manufacturing rights. First engines for Frazer and Kaiser cars will be supplied by Continental Motors except for electrical equipment, but, if all goes well, K-F hopes to be building its own engines eventually.

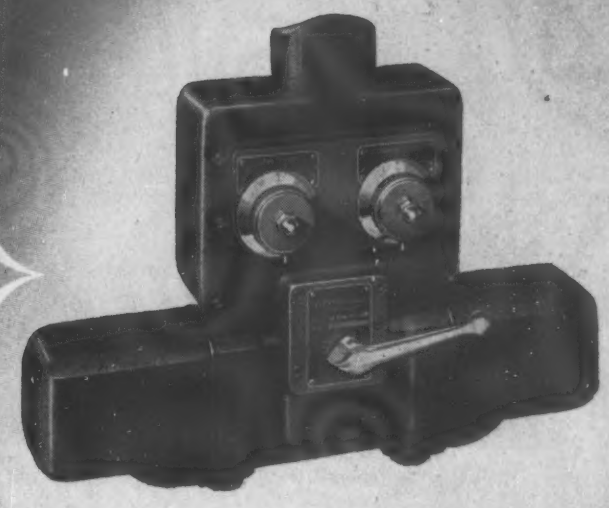
Pilot jobs of both the Frazer and Kaiser automobiles are scheduled to appear from the Willow Run plant (occupied this week by the new tenant) in March, and the operators are talking about 20,000 units monthly by summer. Prices, according to Frazer, will not be set until at least 1000 units are off the line and until they have had opportunity to size up the competition.

Bodies will be manufactured at the Willow Run plant and will be dropped on chassis built up from subassemblies purchased on the outside. Advance dope says they will have the "widest seats on the market." The elaborate ceiling-high fluorescent lighting system of the Willow Run plant, said to include some 155,000 fixtures, will be doused, and new fixtures suspended close to work levels. Present overhead cranes and some conveyors will be continued in use. Word around Detroit last week was that hundreds of machine tools in closed war plants there, now surplus and under control of the RFC, already have been tagged for shipment to Willow Run.

Graham-Paige, headed by Frazer, will occupy part of Willow Run under sublease from K-F Corp. and aims to be producing tractors by January. The company's Rototiller will be built first in the plant of its Warren, O., subsidiary, and contracts have been let for $1 million worth of single-cylinder gasoline engines to power the unit, to Bell Aircraft Corp., Burlington, Vt., division. Larger model is planned for production at Willow Run by spring.

SMOOTH and CONSTANT FEED RATE

regardless of fluctuations in work resistance or hydraulic operating pressure



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VICKERS "Traverse and Feed Cycle" CONTROL PANELS

These panels provide self-contained, compact control units for automatic machine applications where the cycle is a combination of rapid advance, one or two feeds, and rapid return motions. The two feed rates are infinitely variable within their ranges, and adjustments can be made during feed. Applications include drilling, reaming, boring, turning, milling and swaging machinery.

The hydraulic circuit in the panel employs the well-known Vickers Flow Control Valve in a "metering-out" circuit which means a smooth and constantly maintained feed rate for any given adjustment regardless of fluctuations in cutting tool resistance or changes in hydraulic operating pressure.

Simplicity is evident from the fact that there are only two working parts that move. Many standard modifications are available; feeds can be in either direction or both directions; operation is by single or double solenoids integral with panel, separate solenoids or pilot pressure. Practically any cycle sequence can be obtained. See Bulletin 41-10 for complete information.

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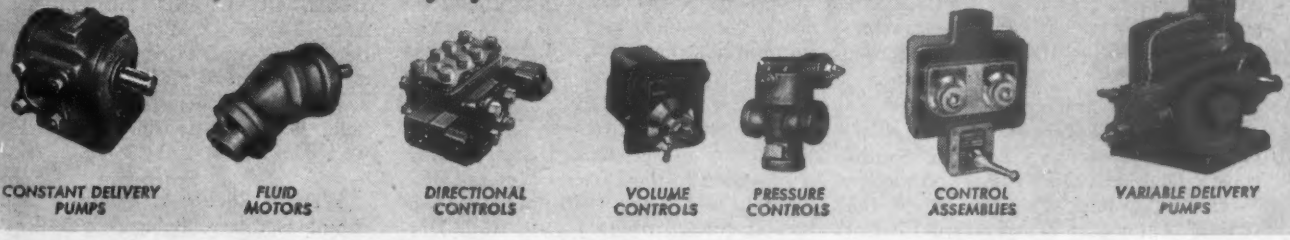

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MEN of INDUSTRY

W. E. MULLESTEIN

A. R. TOFTE

N. F. ADAMSON

W. E. Mullestein, who has been named manager, Coatesville district sales, Lukens Steel Co., Coatesville, Pa., and subsidiaries, has recently returned from Europe where he held a post with the U. S. strategic bombing survey of the War Department. Previously, Mr. Mullestein was acting assistant sales manager of Lukenweld Inc.

—o—

Vincent Manka, formerly assistant to president, Claud S. Gordon Co., Chicago, heat treating engineers, has been appointed general sales manager in charge of sales and advertising.

—o—

Floyd Rose, formerly president, Vanadium-Alloys Steel Co., Latrobe, Pa., has been elected chairman of the board, Firth-Sterling Steel Co., McKeesport, Pa. Mr. Rose had been with Vanadium-Alloys Steel Co. since 1926, and prior to that had been vice president, Heppenstall Co., Pittsburgh.

—o—

Theodore F. Smith, president, Oliver Iron & Steel Corp., Pittsburgh, has been appointed chairman of the board, National Safety Council.

—o—

Sir Andrew Rae Duncan, M. P., has become independent chairman of the executive committee, British Iron & Steel Federation. Sir Andrew Duncan occupied a corresponding post from 1935 to 1940 leaving in January, 1940 to become president of the Board of Trade.

—o—

F. E. Rolston has been named packaging engineer, Dearborn Chemical Co., Chicago. Since 1942, Mr. Rolston has served as industrial specialist with the office of chief of ordnance, Detroit, and prior to his work with the government, he was president, Rolston Engineering Co.

—o—

William D. Macgeorge, formerly chief, electronics laboratory, Baldwin Southwark Division, Baldwin Locomotive Works, Eddystone, Pa., has joined the staff of Automatic Temperature Control Co., Philadelphia, as technical consultant.

—o—

Arthur R. Tofte has been named manager, advertising and public relations department, Allis-Chalmers Mfg. Co., Milwaukee. Mr. Tofte has been a member of the department since 1938, and he succeeds **George J. Callos,** who resigned recently. **W. A. Yost Jr.** has been appointed assistant manager of the company's steam division turbine department. He formerly was in charge of the department's marine division, and in addition to other duties, he will assume direction of sales of steam turbines and gas turbines. **R. N. Landreth** has been appointed assistant to the vice president, General Machinery Division, and will continue to make his headquarters in Washington.

—o—

E. A. Murray has been appointed manager, manufacturers products department, Chicago sales office, American Steel & Wire Co., Cleveland, and **C. J. Quill** has been named assistant manager of that department.

—o—

Raymond W. Young, chief engineer, Wright Aeronautical Corp., Paterson, N. J., since 1940, has been appointed vice president in charge of engineering. **W. G. Lundquist,** who is directing development of an aircraft gas turbine engine for the Wright corporation, was named chief engineer succeeding Mr. Young.

—o—

J. Harold Merrick has been elected a vice president, Rheem Mfg. Co., New York. Mr. Merrick joined the company in 1943 as its general attorney, and recently was named president of a newly-formed subsidiary, Rheem Mfg. Co. of Brazil Inc.

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Col. Frederick C. Horner, now on inactive status in the United States Army, is returning to the General Motors Corp., Detroit, as director, field operations section of the distribution staff. Col. Horner formerly was assistant to the chairman of the corporation on transportation matters.

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N. F. Adamson has been elected vice president, sales and engineering, Twin Disc Clutch Co., Racine, Wis. **E. C. Billings** has been named sales manager, Racine Division; **Roger G. DeLong,** sales manager, Hydraulic Division, with headquarters at the company's Rockford, Ill. plant; **G. W. Buelke,** chief engineer, Racine Division. Mr. Adamson has been general sales manager for the past two years and has been associated with the company for more than 20 years.

—o—

Lincoln Electric Co., Cleveland, recently announced appointment of the following welding engineers: **John A. Smithers,** Detroit area; **W. L. Herbst,** Chattanooga, Tenn.; **Harold H. House,** Moline, Ill., **L. B. Wallner,** Duluth, Minn., succeeding **I. R. Bartter** who has been transferred to Grand Rapids, Mich.; **C. M. Burnett,** Boston.

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C. Leonard Shaw has been appointed publicity manager, Norton Co., Worcester, Mass., succeeding **A. B. Fritts,** who retired Oct. 1 after 37 years' service. Assistant publicity managers are **Russel A. Reed** and **Robert P. Anderson.**

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Russell G. Curtis has joined United Cinephone Corp., Torrington, Conn., as works manager. Until recently and during the war, Mr. Curtis was planning manager, Connecticut Telephone & Electric Division, Great American Industries, Meriden, Conn.

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Marshall B. Taft, formerly of the Aero Division, Minneapolis-Honeywell Regulator Co., Minneapolis, has been made assistant to **Henry F. Dever,** president, Brown Instrument Co., Philadelphia, industrial division of the Honeywell company.

—o—

William Sheldrick, treasurer and assistant secretary, Babcock a Wilcox Co.

and Babcock & Wilcox Tube Co., New York, and who has been an official of the company for 46 years, has retired from active service. **W. G. Dryden** has been designated his successor. **C. H. Clash** has been appointed assistant secretary, Babcock & Wilcox Co., succeeding **F. H. Holloway,** resigned.

—o—

George E. Routh has retired as manager of sales, reinforcing bars and construction specialties, Bethlehem Steel Co., Bethlem, Pa. Mr. Routh's successor is **Stewart B. Brown,** a member of the sales organization's Boston staff. **Charles E. Lehr,** chief engineer, Bethlehem, Pa. plant, has retired after 54 years' service with the company and its predecessor, Bethlehem Iron Co. His successor is **John A. Taylor,** formerly superintendent, lower manufacturing shops.

—o—

George A. Fowles, formerly manager of electric wire and cable insulating materials, becomes sales manager for geon thermoplastics, B. F. Goodrich Chemical Co., Cleveland. **J. H. Field Jr.,** formerly manager of the company's service laboratory in Cleveland, is named manager of technical service for the sales staff. **M. Scott Moulton,** formerly technical service engineer for packaging materials, becomes manager of geon coating and film materials for the paper and textile fields. **Clyde D. Segner** will become Chicago district sales representative.

—o—

M. R. Randlett has been appointed assistant divisional director, Milwaukee paint factory, Pittsburgh Plate Glass Co., Pittsburgh. Since 1932 Mr. Randlett has been manager of trade sales at the Milwaukee plant.

—o—

H. J. Fitzpatrick, formerly works manager, plant 9, Crosley Corp., Cincinnati, has been named works manager of all the company's plants in Cincinnati, in which city the company's radio production will be concentrated. **D. J. Sweeney** has been named engineer in charge of mechanical development, research and advance development department, Engineering Division. **Mrs. Selma M. Andrews** has been appointed home economist, Manufacturing Division. **C. J. Stevens** has been appointed regional manager in the sales department, Manufacturing Division. His territory includes central and southern Illinois, Missouri, Kansas, Oklahoma, Iowa, Nebraska, Colorado and part of Wyoming.

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Charles F. Greene has been appointed Atlanta representative, Storage Battery Division, Trenton, N. J., Philco Corp.

—o—

Paul R. Cutter has joined Hanson-Van Winkle-Munning Co., Matawan, N. J. as an electrochemist. He previously was assistant chief chemist, Consolidated-Vultee Aircraft Corp. at Ft. Worth, Tex.

—o—

John J. B. Fulenwider, general manager, cellulose products department and **J. B. Johnson,** general manager, explosives department, Hercules Powder Co., Wilmington, Del., have been elected directors of the company.

—o—

Douglas Charters has been promoted to assistant district manager, southwest territory, Turco Products Inc., Los Angeles.

—o—

Clay Bedford, general manager of the four shipyards at Richmond, Calif., Kaiser Co. Inc., has been made a member of the board of directors of the Kaiser-Frazer Corp., and has been appointed vice president and a member of the executive committee.

—o—

J. F. Monfils, since 1942 general manager, Pontiac Foundry & Machine Co., Pontiac, Mich., has resigned.

—o—

Fisher Body Division, General Motors Corp., Detroit; has announced the following appointments effective at once: **L. P. Cramer** to be resident manager of its plant at Janesville, Wis.; **E. J. Hanson,** resident manager, Ternstedt Division, Trenton, N. J.; **C. E. Hoehn,** resident manager, Tarrytown, N. Y.; **H. B. Lowendick,** resident manager, Atlanta; **M. J. Olson,** resident manager, Baltimore; and **S. J. Sabourin,** acting resident manager, Grand Blanc, Mich., tank plant.

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Raymond K. McClintock, has been appointed engineering consultant, Sylvania Electric Products Inc., Ipswich, Mass., for its International Division, and will have his headquarters in New York.

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W. Clifford Morrison recently was named district sales manager, New York, Milton Mfg. Co., Milton, Pa.

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Lewis S. Greenleaf Jr. has resigned as regional director, War Production Board in New York. He becomes vice president in charge of sales, Durex Abrasives Corp., New York.

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Lawrence D. Bell, president, Bell Aircraft Corp., Buffalo, is chairman of a recently organized executive committee. Other members of the committee include: **Ray P. Whitman,** vice president, sales; **Charles L. Beard,** vice president, finance; and **D. Roy Shoults,** vice president, engineering. **Lester Benson** has been named manager, manufacturing department; **David G. Forman,** manager, helicopter operations, and **Leston P. Fanuef,** secretary.

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Herbert J. Arnold, until recently metallurgist, Aircraft Division, Packard Motor Car Co., Detroit, has been appointed metallurgical engineer, Crucible Steel Co. of America, New York.

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J. Garfield Lorriman has been appointed assistant district sales manager, Jones & Laughlin Steel Products Co.,

JOHN LAURITSEN

Who has been named general manager, J. B. Kendall Co., Washington, as noted in STEEL, Oct. 8 issue, p. 95.

P. F. KOHLHAAS

Who is vice president in charge of engineering, Columbia Steel Co., San Francisco, as noted in STEEL, Sept. 3 issue, p. 104.

S. H. CODDINGTON

Who has been appointed Detroit representative, Sol H. Friedman Co., as noted in STEEL, Oct. 8 issue, p. 95

Toronto, Ont. For the past three years Mr. Lorriman has served as a lieutenant with the Royal Canadian Navy Volunteer Reserve and he was honorably discharged from the service this past September.

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John E. Marquis has been named to the ceramic laboratory staff, Pemco Corp., Baltimore.

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Prof. John E. Schoen, head of the mechanical engineering department, Marquette University, Milwaukee, has been named to the executive board of the Milwaukee section, American Society of Mechanical Engineers, succeeding **Dr. John T. Rettaliata.**

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H. Y. Satterlee has been appointed sales manager, Pacific Engineering Corp., Los Angeles. He formerly was assistant sales manager, Edo Aircraft Corp., College Point, N. Y.

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Robert D. Becker has been appointed manager, Utensil Division, Reynolds Metals Co., Louisville, Ky., replacing **M. E. Horn,** who resigned recently. **George L. Root** has joined the company as a development engineer on aluminum textile applications. After Nov. 1 his headquarters will be in the company's New York office.

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R. E. Walsh has been appointed assistant manager of the roll department, Continental Foundry & Machine Co., Pittsburgh. Mr. Walsh will make his headquarters at the Chicago works of the company at East Chicago, Ind.

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John M. Cooney has been appointed Boston district manager of the company's Industrial Products Sales Division, B. F. Goodrich Co., Akron. **Roy C. Taylor** has been appointed assistant controller, succeeding the late **J. H. McGill.**

—o—

Harry G. McMurry, since February on special assignment foundry work for the Buick Motor Division, Flint, Mich., General Motors Corp., has been appointed foundry manager for General Motors Holdens Ltd., Melbourne, Australia, and will leave for Melbourne shortly after the first of the year to supervise layout and construction of a new automotive gray iron and malleable foundry there. Until leaving for Australia he has headquarters at General Motors Overseas Division, Detroit.

—o—

Clifford G. Strote has been appointed purchasing agent for H. C. Frick Coke Co., Pittsburgh, United States Coal & Coke Co., Pittsburgh, and associated companies. He succeeds **George W. Brown,** who is retiring after 53 years' association with the H. C. Frick Coke Co. and other corporation subsidiaries. Mr. Strote formerly was purchasing agent, Geneva Steel Co., Geneva, Utah.

—o—

Leo B. McCoy has been appointed sales representative in the New Jersey territory and **Harold J. McKay,** service engineer in New York, for Janitrol gas-fired furnaces and burners produced by Surface Combustion Corp., Toledo, O. **Carl H. Langendorf** has been appointed the corporation's sales and service engineer in the St. Louis territory.

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L. L. Adams has been appointed assistant to the vice president, traffic, United States Steel Corp. of Delaware, Pittsburgh.

—o—

Lt. Col. John S. Tawresey has been appointed vice president in charge of engineering, Bunting Brass & Bronze Co., Toledo, O. Colonel Tawresey formerly was executive assistant to the chief of the resources control section. U. S. Army Air Corps, Wright Field, Dayton, O.

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F. H. Talmon has been promoted to general sales manager, Torridheet Division, Cleveland Steel Products Corp., Cleveland. Mr. Talmon has been director of personnel and public relations for four years.

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Ralph F. Peo has resigned as vice president and a director of Houdaille-Hershey Corp., Detroit, and as general manager of the corporation's subsidiary, Houde Engineering Division, Buffalo.

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National Tool & Die Manufacturers Association, Cleveland, has elected the following officers at its recent business meeting held in Buffalo: **Richard F. Moore,** Moore Special Tool Co., Bridgeport, Conn., president; **Willis G. Ehrhardt,** Ehrhardt Tool & Machine Co., St. Louis, first vice president; **Leonard E. Mingus,** Wm. P. Stein & Co. Inc., Rochester, N. Y., second vice president; **Jack Kleinoder,** John Volkert Tool & Die Co., secretary; and **Herbert F. Jahn,** B. Jahn Mfg. Co., New Britain, Conn., treasurer. **George S. Eaton** is executive secretary.

—o—

Curtiss-Wright Corp., Airplane Division, Buffalo, has announced the following resignations: **Nathan F. Vanderlipp,** executive engineer; **Adrian W. Smith,** executive assistant to **Burdette S. Wright,** vice president; **Charles H. Augspurger,** public relations director.

—o—

Robert D. Pollock, vice president, has been placed in charge of manufacturing, and **Howard A. Benzel,** vice president, in charge of engineering, Scott Aviation Corp., Lancaster, N. Y. **Hans Flygare** has been appointed comptroller; **John P. Knights,** personnel director; **Arthur S. Brown,** sales manager; and **Robert Welch,** production manager.

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T. S. Bowie has been named director of the Basik plan, and **Val G. Jurgeal,** director of promotion, Liberty Distributors, Philadelphia, an organization of hardware wholesalers.

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Boyd J. Outman and **Nathan L. Fribourg** have become associated with Columbia Iron & Metal Co., Cleveland.

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Allan N. Sheahen, who has served as assistant to **Raymond S. Livingstone,** vice president in charge of personnel, Thompson Products Inc., Cleveland, has been named personnel manager of the company's Tapco plant in Euclid, O.

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Robert A. Weaver, president, Ferro Enamel Corp., Cleveland, has been elected to the board of directors, Brown Fence & Wire Co. Directors re-elected to the Brown company board, include: **James Brown, A. C. Winger, Richard W. Taylor, Fred E. Linder, Carlton M. Higbie, Sydney A. Davies, C. O. Hodge.**

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Hunter Nicholson has been appointed Los Angeles factory manager, Kelite Products Inc., Los Angeles.

OBITUARIES . . .

Clarence F. Succop, 57, president and director, American Roller Bearing Co., Pittsburgh, died Oct. 4, following a year's illness.

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Walton A. Manson, 61, engineer for American Steel & Wire Co., Cleveland, died Oct. 8 at his home in that city.

—o—

Alexander W. Treaden, 62, assistant manager of the Cleveland branch, John A. Roebling's Sons Co., Trenton, N. J., died Oct. 3 at his home in Bay Village, O. He has been associated with that company for 41 years.

—o—

James H. Grose, 79, who served at one time as president, Brier Hill Steel Co., Youngstown, now a part of the Youngstown Sheet & Tube Co., died recently.

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Stoddard B. Martin, 53, owner, S. B. Martin & Co., Cleveland, distributor in Ohio and western Pennsylvania of automatic machine tools, and an inventor of several machine tool improvements, was drowned on a fishing trip in Canada Oct. 5.

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Joseph L. Pereles, 47, president, Pereles Bros. Inc., Milwaukee, died Oct. 4 in New York, while on a business trip.

—o—

Henry T. Richardson, 45, assistant manager in St. Louis, Carnegie-Illinois Steel Corp., Pittsburgh, died Oct. 8 at his home in that city.

Kaiser To Stay in Steel Business

Believes Fontana plant can compete both with other western mills and eastern plants shipping to Coast by water. Wants to lease, not buy outright, government-owned plant in Utah

HENRY J. KAISER intends to continue to be a figure in the nation's steel business. This is evidenced by two emphatic statements made recently by the West Coast industrialist: 1. He is convinced that his Fontana, Calif., plant can compete succes fully with other West Coast mills as well as eastern mills shipping to the western area by water; 2. he definitely is interested in taking over the Geneva Steel Co. plant in Utah on a lease basis, but not on outright purchase.

During the war, the Office of Price Administration permitted Kaiser to sell plates and shapes from his Fontana plant at 3.20c per lb, fob Los Angeles, while the prices applying to most other companies were 2.80c, delivered Pacific ports, for plates and 2.75c for shapes. These prices apparently still apply, but, when business finally settles down to peacetime conditions, Kaiser figures that by writing down capitalization of the plant he can sell competitively with any other company. He also expects to improve his cost position on coal and ore.

Plans for the future, Mr. Kaiser said during a recent Cleveland visit, include the construction of a continuous hot strip mill and facilities for production of tin plate. The sheet and tin plate market on the West Coast is estimated at 900,000 tons annually, of which the proposed new Columbia Steel Co. mill will absorb only 300,000 tons. At Fontana, Kai er now has a blast furnace, open hearth and electric furnaces with finishing mill facilities for the production of 300,000 tons of plates, 10,000 tons of shapes and 180,000 tons of bars.

Envisions Own Trading Area

The Geneva Steel plant, operated by the United States Steel Corp. for the government, also has been getting prices over OPA ceilings for plates and shapes, delivered to the West Coast, namely 3.20c, Pacific ports, for plates and 3.25c for shapes. Mr. Kaiser feels that sufficient market for the Geneva plant can be developed in its own trading area, which would include the Rocky Mountain states and Texas and Oklahoma. In addition, Mr. Kaiser envisions the establishment of a number of fabricating plants in the Geneva area itself which would take a substantial part of its output. Mr. Kaiser indicated that No. 1 on the list of new fabricating plants would be one for railroad cars.

The Geneva mill not only is excellent from a technical standpoint but has the advantage of being close to suitable raw materials, including iron ore, coking coal and limestone.

Geneva has three 1200-ton blast furnaces, 212 coke ovens and nine 225-ton open hearths, plus a 45-in. blooming and slabbing mill with annual capacity of 1,058,800 tons, a 132-in. plate mill with capacity of 700,000 tons, and a 32-26-in. structural mill with capacity of 250,000 tons.

Room was left for additional stands for the plate mill so that sheets and strip could be rolled. Other finishing facilities also were considered. The structural mill was designed to roll lighter steel sections, such as I-beams, angles and channels along with heavy sections. In addition, it will roll light and medium forging billets. An official of the Defense Plant Corp., which financed the mill, recently told STEEL that the government would be willing to lay out the additional funds necessary to round out Geneva's facilities.

General Motors Expanding Western Assembly Plant

LOS ANGELES

Construction is under way on a plant expansion of the General Motors assembly unit at South Gate, Calif., Los Angeles suburb. Henry L. Clark, manager, says employment will be increased from the present 700 to 3000 by next Jan. 1, when the addition is slated for completion.

Floor space is being increased from 718,000 sq ft to 1,075,000 sq ft.

Kinner Motors Buys Kinney Iron Works

LOS ANGELES

Kinner Motors Inc. has purchased the Kinney Iron Works in this city. Kinner produces iron and steel castings and is licensee in the west for Meehanite, high tensile strength iron alloy.

The new company will be operated as an independent subsidiary of Kinner under the name Kinney Iron Works Inc.

Kinner Motors, it was indicated, plans a change of name to Gladden Products Corp.

Ellinwood Industries Acquires Two Companies

LOS ANGELES

Ray Ellinwood, president of Ellinwood Industries, has announced that his company had acquired the California Motor Cultivator Co. Ltd., makers of the Cat line of garden tractors, and also had purchased National Machine Products Co., the latter still engaged on war contracts.

Plans call for continued production of Cat tractors, a new type can opener and an adding machine.

EMPTY WAYS: Workmen and sponsors leave the empty ways of the California Shipbuilding Corp. as the last of the Calship Victory ships was christened. Previously, the company had launched 466 other vessels during the war program. NEA photo

WING TIPS

Aircraft Scheduling Unit and parent organizations, Aircraft Production Board and Aircraft Resources Control Office, dissolved. ASU scheduled production of aircraft and components, determined requirements and allocated materials to producers

DISSOLUTION of the Aircraft Scheduling Unit and its parent organizations, the Aircraft Production Board and the Aircraft Resources Control Office, has been completed.

In announcing the dissolution of the ASU, Brig. Gen. E. W. Rawlings, chief of the procurement division, Air Technical Service Command, and administrator of ASU, said: "The role of the ASU in the aircraft procurement and production program has consisted of aircraft and component production scheduling, determination of requirements for materials and components for the aircraft program and materials allocation to the aircraft producers. These functions were carried out on an industry-wide basis for the aircraft industry without regard to the ultimate users of the end-products of any particular contractor. The actual work in these operations was done for ASU by Army Air Forces and Navy Bureau of Aeronautics personnel working in the procurement division, ATSC."

The unit's primary concern was to reduce production conflicts in the aircraft industry as much as possible; to foresee requirements and provide for the whole aircraft industry before specific problems struck individual manufacturers; and to aid the production of one manufacturer in preference to another so that the industry's combined output best suited the war effort.

Membership of the Aircraft Scheduling Unit, at the time of dissolution, was: General Rawlings, Capt. J. M. Weldon, USNR, representing the Navy Bureau of Aeronautics, and Col. W. Sturmy Cave, representing the British Air Commission.

The Aircraft Scheduling Unit was established at Wright Field in April, 1941, by the secretary of war and with concurrence of the secretary of the navy and British Supply Council, to meet the need for an organization to control the flow of materials and parts to prime aircraft contractors in order that delivery schedules might be met. As early as 1940 aircraft manufacturers had no clear view of how to carry out the many new contracts for production far in excess of their capacity. The British and French had military aircraft on order in the United States in quantities 10 to 20 times as great as the U. S. Army and Navy. The industry was geared to produce but 200 to 300 aircraft per month, and these of light gross weight. During the summer of that year, reports were prepared on airplanes, engines and propellers, setting out schedules of proposed deliveries on existing contracts from each individual firm. Materials and parts had to be controlled, however, if the appropriate prime contractor was to receive them at the proper time to meet his part of the delivery schedules. It was to meet this need that the Aircraft Scheduling Unit was established.

As originally set up the unit was composed of four members, one each from War Production Board, the AAF, Navy, and British Air Commission. WPB representation was later withdrawn. Operating personnel, numbering almost 3000 at peak, was supplied by the Air Technical Service Command and the Navy Bureau of Aeronautics, carrying out the functions of the Unit from Wright Field and from AAF Procurement District Offices.

One of the first problems faced by the Aircraft Scheduling Unit was how to determine what materials, parts and components would be required to build the various airplane "schedules." The solution had to be found through detailed studies, surveys of the industry, and bills of materials. As a result of these studies, the War Production Board, where necessary, was informed of the industry's requirements, and material facilities were expanded to meet them. The unit made special studies of 260 components and items of equipment, and of 224 basic materials; and collected over 9100 bills of materials, supplying basic requirement information on 6000 to 7000 items.

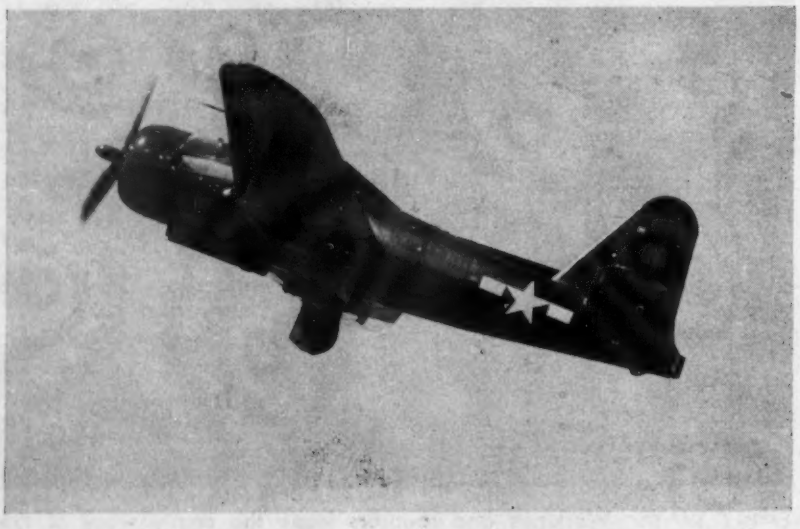
Overcomes Critical Shortages

In the mushrooming expansion of aircraft production, "critical shortages" of materials, components, equipment and tools were created by many factors—production acceleration, engineering changes, insufficient basic materials, limited production capacity, fabrication troubles, errors or delays in planning and ordering, transportation difficulties and the like. The satisfaction of critical shortages was another of the principal tasks of ASU, and the production set up for the relief of these shortages was continued throughout the unit's existence. Three main methods were used: Rescheduling the supplier to adjust the deficit; obtaining goods from another source, or from idle stock held by another manufacturer; and requesting the WPB to issue production directives to the supplier. During the period 1942-1945, ASU received over 50,000 critical shortage reports.

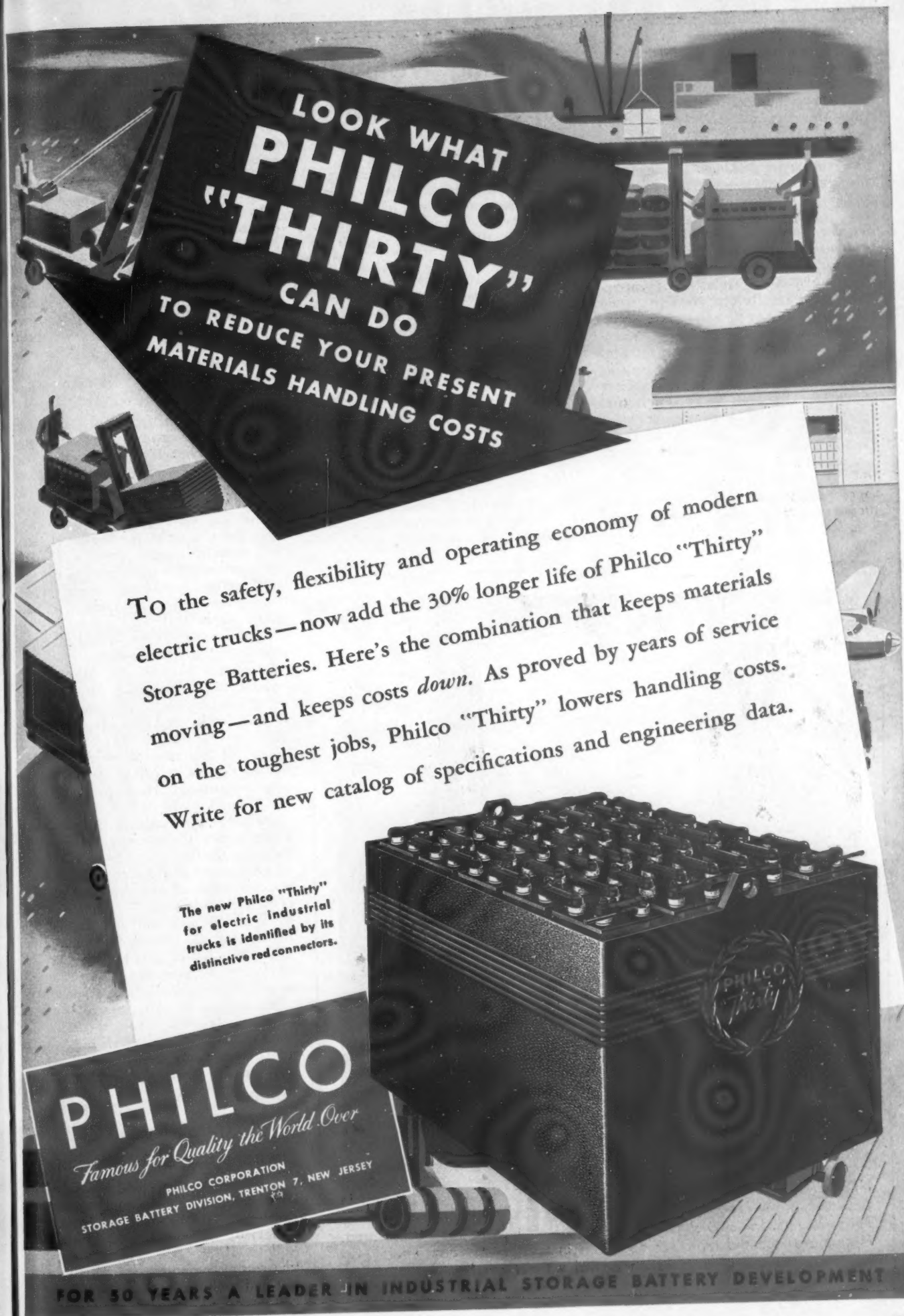
Which individual type of airplane should receive components and materials in short supply was another problem the Aircraft Scheduling Unit had to solve. As agreement on this proved progressively more difficult, the Joint Aircraft Committee established a "preference list" of aircraft grouped in the order of tactical importance. This list was amended and brought up to date from time to time, and the ASU allotted materials and components so that the first and second groups were built complete, and the remaining groups allowed to lag behind as little as necessary.

In administering the Controlled Materials Plan, the Aircraft Scheduling Unit determined all allotments of these materials to the aircraft industry, serving nearly 2000 prime contractors, and processing 61,471 applications for allotments involving over 7 billion pounds of steel, 3½ billion pounds of aluminum, and 500 million pounds of copper and alloys.

"Throughout its life, the Aircraft Scheduling Unit operated with a view to



TWO PROPULSION SYSTEMS: First Navy fighter to use jet propulsion, this Ryan Fireball also is equipped with a Wright Cyclone radial engine. The combination makes it efficient at all altitudes


LOOK WHAT
PHILCO
"THIRTY"
CAN DO
TO REDUCE YOUR PRESENT
MATERIALS HANDLING COSTS
To the safety, flexibility and operating economy of modern electric trucks—now add the 30% longer life of Philco "Thirty" Storage Batteries. Here's the combination that keeps materials moving—and keeps costs *down*. As proved by years of service on the toughest jobs, Philco "Thirty" lowers handling costs. Write for new catalog of specifications and engineering data.
The new Philco "Thirty" for electric industrial trucks is identified by its distinctive red connectors.
PHILCO
Famous for Quality the World Over
PHILCO CORPORATION
STORAGE BATTERY DIVISION, TRENTON 7, NEW JERSEY
FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

building the maximum number of airplanes, components, and parts that the industry could produce, of the type tactically most required, without regard to which service would receive them," adds General Rawlings. "It was a policy of the ASU to meet and consult with industry on major problems and work out co-operatively the necessary solutions and policies. The directive method of operation was used as little as possible. For each directive issued, consultation produced results in a hundred cases, which is a great tribute to extraordinary co-operation of the industry. Industry-wide meetings helped resolve many problems. Industry advisory committees, formed among suppliers of common items, contributed effectively to programs of standardization, specifications, and capacity. Early in the war, aircraft producers organized War Production Councils, pooling their resources and 'know-how.' These councils acted as clearing houses for the member aircraft companies, and prevented disruption of critical production schedules. Without the courage, support, and resources of the aircraft industry, it would have been impossible to achieve such success."

"Canning" Valuable War Surpluses To Be Important Postwar Job for Glenn L. Martin

"CANNING" in aluminum of valuable war surplus materials, running all the way from heavy machine tools to delicate instruments and electrical apparatus will be one of the peacetime projects of the Glenn L. Martin Co., Baltimore.

Development of ingenious aluminum "barriers," some of which "breathe" through a drying agent and others of which are hermetically sealed, has come about through experimental contracts with the Ordnance Department of the Army for the canning of guns. It has been determined that by such methods all sorts of manufactured articles and materials can be stored in the open for many years without rust, corrosion or deterioration.

By eliminating the necessity for warehousing, this development solved one of the great problems confronting those interested in the storage of surplus war materials permitting the storage of "canned materials" in the open on government reservations or other open spaces.

In announcing the project which conceivably can run into big business and occupy all of the surplus plant space of the airplane company, Glenn L. Martin, president of the company, declared billions of dollars worth of equipment made during the war could be saved for future market. Otherwise, he pointed out, it might lose all but junk value or else expend all its true values in expensive warehousing and constant maintenance before it could be used again.

Mr. Martin also expressed the opinion that the new scientific "canning" process would be a boon to exporters and importers in the shipping and outdoor storage of valuable stocks. Not only can the contents be absolutely protected against any climatic or weather conditions, but a great saving can be effected over extended periods through eliminating warehousing costs, as well as through weight saving over heavy wood crating, thereby cutting shipping costs. Every pound of weight and cubic foot of volume saved represents a real saving in overall cost to the consumer.

Aluminum is used, Mr. Martin said, because of its resistance to corrosion, its lightness of weight and because great surplus stocks and manufacturing potential are available.

One of the most interesting of the Martin devices is called the "balanced pressure barriers." The big can, now being tailored to fit field guns, actually "breathes" away moisture. At night and under cloudy conditions, the barrier inhales air through a screen of silica gel, which has one of the highest known absorptive values of any desiccant capable of being reactivated. In sunlight it exhales air through the gel, drying and reactivating the desiccant automatically.

The canning of industrial presses and machinery, engines, motors, instruments, communications equipment, typewriters, office equipment, wire and all sorts of electrical assemblies and thousands of other items mass-produced far beyond normal consumer needs would protect enormous private investments, Mr. Martin explained.

NEW MOTOR CONTAINER: Steel containers, 8 feet tall and 5 feet in diameter, are welded at the Warren City Mfg. Co., subsidiary of Graham-Paige Motors, for safe shipment of aircraft engines to the Pacific area. Motors are mounted on shock absorbers in the air-tight cans which permit use of engines on arrival without overhauling

Flyability of Martin-202 Demonstrated by Mockup

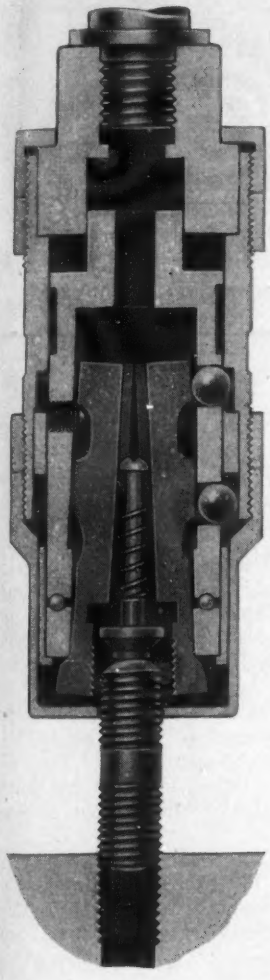
A hinged "cockpit" which never goes anywhere and a panoramic runway on which only a fly could land have been combined at the Glenn L. Martin Co. Middle River, Md., plant to show transport airline pilots the flyability, comfort and visibility of the Martin-202 cargo-transport trunkline feeder plane.

HIGH SPEED STUD DRIVING THE NEW WAY

A FAST OPERATION TIMED IN SECONDS

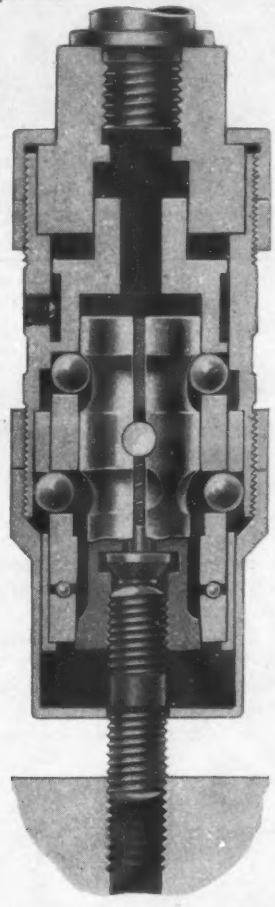
1

Tool prior to loading.



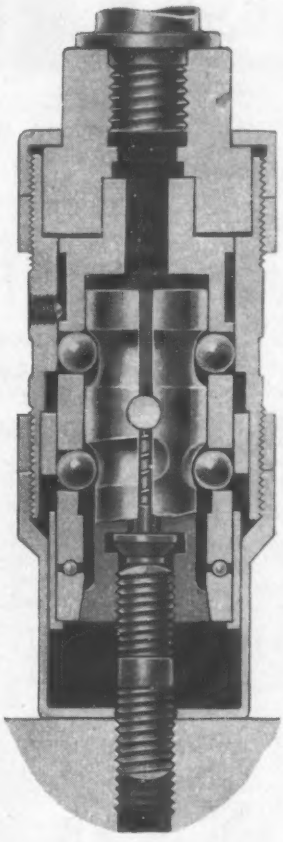
2

Tool with jaws locked in full register on the stud by upper balls, but without lower driving balls in positive driving position.



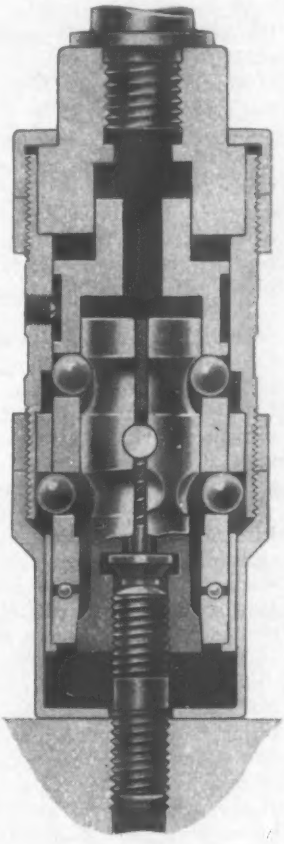
3

Tool in positive driving position with driving balls pulling jaws up into taper nose bushing. Stud is partially driven to depth.



4

Stud is driven to proper depth and drive balls are again in free position, but with jaws still locked in full register as in figure 2. The jaws open up when the tool is lifted off to drive the next stud.



The TITAN No. 100 SERIES AUTOMATIC SELF-OPENING STUD DRIVER is the only tool of its kind to incorporate an automatic take-up for wear on the jaws. As the threads in the jaw become worn, the action of the driving balls on the jaw drive shoulder tends to pull the jaws up in the taper nose bushing, causing them to close in on the stud. The illustrations show clearly how the jaws are locked in full register, how the tool comes down and how the cycle reverses. Another important feature of this stud driver is the inexpensive method by which the clutch can be renewed. This is accomplished simply by pressing the cam ring out of the main ring, reversing it, and pressing it back. This gives double wear. In driving shoulder studs, the amount of torque applied should be limited; in this case, use the TITAN No. 100 SERIES CONTROLLED DRIVE STUD DRIVER, a tool that has an adjustable over-running clutch so that the stud can be driven to any pre-determined torque.

TITAN TOOLS

WRITE FOR BULLETIN NO. 100

MANUFACTURED BY TITAN TOOL CO. FAIRVIEW, PENNA.

G-E To Double Prewar Steam Turbine Output

Full-scale peacetime production at General Electric turbine factories expected to be reached in December

GENERAL Electric Co., Schenectady, N. Y., which has produced two-thirds of the country's present steam-turbine capacity, expects its peacetime production of steam turbines to be double that of the prewar period.

In making this estimate, Chester H. Lang, vice president and apparatus sales manager of General Electric, said the company has a backlog of more than $30 million in turbine-generator orders, covering both new installations and replacements of obsolete machines.

Full-scale peacetime production is expected to be reached by December in the General Electric turbine factories at Lynn and Fitchburg, Mass., and Schenectady. The backlog of turbine orders at present includes more than 40 machines with a total capacity in excess of one and one-half million kilowatts.

During the four war years General Electric's turbine production was nine times the average prewar yearly production. Factories were operated at Erie, Pa., and Syracuse, N. Y., in addition to the plants at Schenectady, Lynn, and Fitchburg.

The greatest expansion in the war period was in the marine turbine manufacturing facilities. The company's production volume of marine turbines, in terms of total horsepower capacity of the machines, was greater than the equivalent figure during 40 years of land turbine manufacture. Approximately 75 per cent of the turbine horsepower now driving U. S. Navy fighting vessels is produced by machines made in General Electric's turbine factories or designed by the company and made elsewhere.

Southern New England Scrap Group Elects Officers

The Southern New England chapter of the Institute of Scrap Iron & Steel Inc. has re-elected all of its officers and members of its executive committee. Joseph A. Schiavone, M. Schiavone & Sons Inc., New Haven, Conn., was re-elected president. Other officers include: First vice president, S. Samuel Kasden, H. Kasden & Sons Inc., New Haven, Conn.; second vice president, Leo H. Dragat, H. Dragat & Son Inc., Hartford, Conn.; and secretary-treasurer, Michael J. Stavola, M. J. Stavola & Co., Danbury, Conn.

WINS "E": Army-Navy "E" award is presented to Triplex Screw Co., Cleveland. Left to right are: Maj. Cornelius D. McLaughlin; A. F. Weber, president of the company; and Joe Mis, representing employees

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Toolcraft Products Co., 915 Webster St., Dayton, O., is enlarging its plant. When the addition is completed, Toolcraft Engineering Co., now located at 126 South Ludlow St., Dayton, will move into part of the addition.

—o—

Federal Products Corp., Providence, R. I., has announced its southern Texas representative, E. L. Stacey, has located in a permanent office at 718 Leeland Ave., Houston 2, Tex.

—o—

Food Machinery Corp., San Jose, Calif., has acquired from Fred C. Edmison and Robert A. Roth the assets and business formerly owned by Mechanical Foundries Inc., Vernon, Calif. The firm will operate as a division of Food Machinery Corp. and will be known as Mechanical Foundries Co. Mr. Edmison is president and general manager of the new subsidiary.

—o—

Pittsburgh Carbon Brush Co., Pittsburgh, has been purchased by Sam Heppenstall, formerly associated with Heppenstall Co., Pittsburgh, and more recently vice president of H. K. Porter Co., Pittsburgh. Ray Hausen, a founder of Pittsburgh Carbon Brush Co., will remain as vice president.

—o—

Westinghouse Electric Corp., Pittsburgh, is purchasing in Meadville, Pa., from Talon Inc. property and buildings that will be used in production of industrial heating equipment.

—o—

General Blower Co., 8608 Ferris Ave., Morton Grove, Ill., has expanded its facilities by constructing two one-story buildings. The factory which the company formerly operated at 401 North Peoria St., Chicago, has been closed, and a general sales office has been opened at 510 North Dearborn St., Chicago.

—o—

Sundberg & Ferar, Detroit, designing firm, was selected to open the 1945-46 Industrial Design exhibition of the Philadelphia Art Alliance. The exhibition opened Oct. 1 and will continue through May, 1946.

—o—

American Photocopy Equipment Co., Chicago, announced that Joseph S. Lederer has withdrawn as a partner from the firm. Operation of the company will continue as in the past.

—o—

Dominion Oxygen Co. Ltd., a unit of Union Carbide & Carbon Corp., New York, will construct an oxygen producing plant and an acetylene generating plant at Vancouver, B. C., and an oxygen filling station at Winnipeg, Man.

—o—

Research Corp., New York, announced that scientists will have an opportunity to return to college laboratories for scientific research and teaching through grants of $2.5 million offered to educational institutions by Research Corp., a nonprofit organization.

—o—

Hewitt Rubber Corp., Buffalo, has appointed the P. J. O'Donnell Co. Inc., as Boston distributor and to handle sales of industrial rubber products in eastern Massachusetts.

—o—

Atlas Brass Foundry Inc., Los Angeles, has made application to increase auth-

rized capital stock from $75,000 to 200,000 to expand present physical facilities.

—o—

Ziegler Steel Service Co., Los Angeles, announced it will carry a complete stock of steel sheets, strip and light plate in hot-rolled, hot-rolled pickled and oiled, cold-rolled and galvanized finishes. Production shearing facilities are to be available soon. Ziegler Steel Service Co.'s Direct Sales Division will continue to represent warehouses and mills, thus offering complete steel service, specializing in all types of flat-rolled steel.

—o—

Latisteel Inc., Pasadena, Calif., will establish a plant in New England.

Michigan Chapter of Scrap Institute Elects Officers

Ben Kramer, Kramer-Orloff Co., Detroit, has been elected president of the Michigan chapter, Institute of Scrap Iron & Steel Inc., for the coming year. Other officers of the Michigan chapter are: First vice president, Louis Brown of Joe Brown & Sons, Grand Rapids, Mich.; second vice president, Jay Lenick of E. Lenick & Co., Saginaw, Mich.; secretary, Mannie Fishman of Modell Iron & Metal Co., Detroit; and treasurer, Louis Freedman of Woodmere Scrap Iron & Metal Co., Detroit.

Harry Goldberg Will Head Cincinnati Scrap Chapter

Harry Goldberg, Goldberg Iron & Steel Co., Columbus, O., has been elected president of the Cincinnati chapter of the Institute of Scrap Iron & Steel Inc. for the coming year.

Other newly elected officers of the Cincinnati chapter are: Vice president, Ralph Kopelove, Kopelove Iron & Metal Co., Dayton, O., and secretary-treasurer, Frank Miller, David J. Joseph Co., Cincinnati.

New Institute To Sponsor Research Work on Z-Metal

Formation of Z-Metals Research Institute Inc. to sponsor research and development of the pearlitic malleable iron commercially known as Z-Metal has been announced. The institute's office is located at 1060 Broad St., Newark 2, N. J.

A contract has been made with Battelle Memorial Institute, Columbus, O., whereby research work that the Battelle Institute has been conducting on Z-Metal will be expanded.

Directors of Z-Metals Research Institute are: Duncan P. Forbes, president, Gunite Foundries Corp., Rockford, Ill.; P. E. Landolt, president, Z-Metals Inc., New York; Brinton Welser, vice president, Chain Belt Co., Milwaukee; A. F. Crone, vice president, Acme Steel & Malleable Iron Works, Buffalo; J. L. Linsley, director of research sales, Eastern Malleable Iron Co., Naugatuck, Conn.; A. C. Moore, president, Chicago Railway Equipment Co., Chicago; and P. H. Vincent, general manager, Erie Malleable Iron Co., Erie, Pa.

Officers are: President, Mr. Forbes; vice president and secretary, Glynne Morris, who also is general manager of Z-Metals Research Institute Inc.; and treasurer, Mr. Crone. C. R. Wiggins, formerly with Republic Steel Corp., is staff metallurgist of the institute.

Brassert To Direct Foreign Business from New York

H. A. Brassert, chairman and president of H. A. Brassert & Co., has consolidated his foreign consulting and engineering business in the New York office of the Brassert firm, 60 East 42nd St.

The engineering division of H. A. Brassert & Co. Ltd., London, which formerly handled a portion of the foreign work, has been taken over by John Miles, Mr. Brassert's former managing director.

H. A. Brassert & Co. of New York will open a branch office in Paris to centralize the handling of its European business.

Steel Partition Division Bought By Hauserman

Cleveland firm acquires portion of Globe-Wernicke business. Latter company to expand other divisions

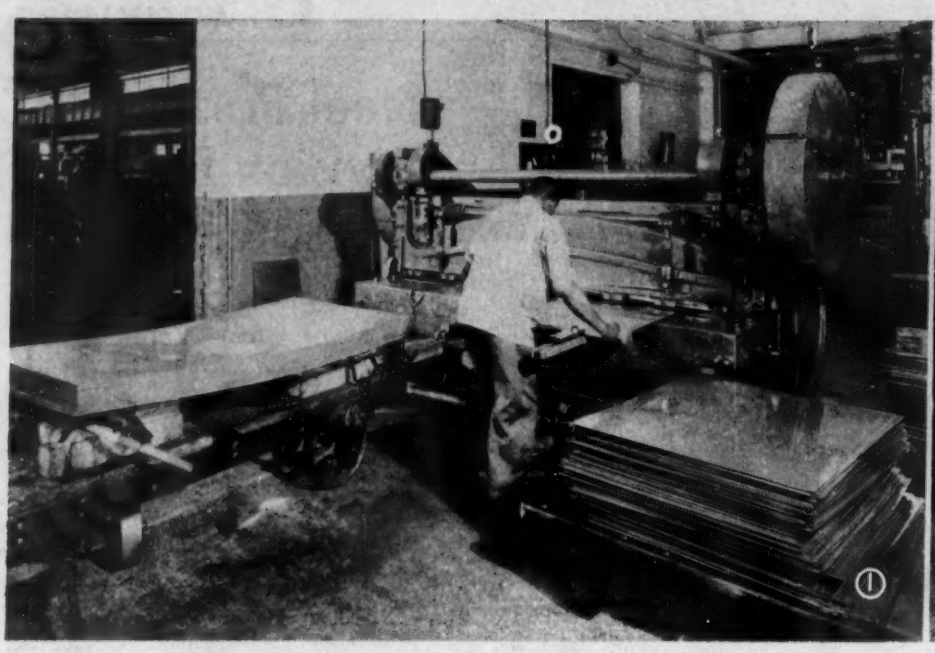
ACQUISITION of all tools, dies, and machines of the steel partition division of the Globe-Wernicke Co., Cincinnati, has been made by the E. F. Hauserman Co., Cleveland 5, manufacturer and erector of steel partitions and wall linings.

The Globe-Wernicke Co., manufacturer of more than 4000 items for office use, entered the steel partition field a score of years ago, and was active in this business until the use of steel for this purpose was restricted.

Because of the expanding scope of its many other divisions, Globe-Wernicke has decided against postwar renewal of steel partition fabrication.

The Hauserman company is prepared to handle any changes or alterations which might be desired on former Globe-Wernicke partition installations.

PLAN PEI PROGRAM: Program committee of the Porcelain Enamel Institute, meeting at Cincinnati recently, voted to re-establish a fellowship at the National Bureau of Standards and favored the setting up of a long-range program of research. Shown at the committee meeting are, left to right: P. B. McBride, Porcelain Metals Corp.; G. H. Spencer-Strong, Pemco Corp.; F. E. Hodek, Jr., General Porcelain Enameling & Mfg. Co.; Edw. Mackasek, Porcelain Enamel Institute; R. H. Turk, Pemco Corp.; F. C. Woleslagle, Carnegie-Illinois Steel Corp.; R. A. Weaver, Ferro Enamel Corp.; Wm. Hogenson, Chicago Vitreous Enamel Product Co.; R. A. Dadisman, American Rolling Mill Co.; B. T. Sweely, Chicago Vitreous Enamel Product Co.; W. F. Wenning, Ceramic Color & Chemical Mfg. Co.; and Miss Gladys Harley of the institute



Container Line . . .

employs unusually effective setup that makes 35-in. longitudinal welds at rate of 400 hourly, using submerged arc process

HUGE quantities of shell containers have answered the need for a method of packaging shell that would mechanically protect the comparatively soft band that engages the gun rifling upon firing, and at the same time offer effective protection against the elements. Original method of shipping in wood boxes did not afford the corrosion protection required in long overseas shipments and storage in tropical climates. But the effectiveness of today's ammunition is securely guarded by a steel container that affords excellent protection against corrosive elements as well as against mechanical damage.

A large supplier of such containers is the Murray Ohio Mfg. Co., Cleveland. Pictured here are some of the important operations in fabricating containers for 105 mm shells. Containers are 35 in. long, 6 in. in diameter. They are made of 14-gage hot-rolled steel. (Cold-rolled steel, incidentally, was found to require more current in the welding operation). Sheet is received from the mill in a size 37¼ in. wide, 70½ in. long.

First operation, Fig. 1, is to cut the sheets in half. Material and parts in process are handled through the plant on skids and skid boxes for the most part, using power lift trucks. Dollies, such as the unit at left, Fig. 1, are used less often.

Second operation is to blank the half sheets to accurate size. In foreground of Fig. 2, two blanks are being cut from each half-sheet, a short section of gravity feed roller conveyor then taking the blanks on to the second unit where they undergo the first forming operation.

Three die setups in a single press, Fig. 3, then take care of the remaining forming operations. From here the part is thoroughly cleaned in an alkali solution. After drying, it is ready for welding the longitudinal seam.

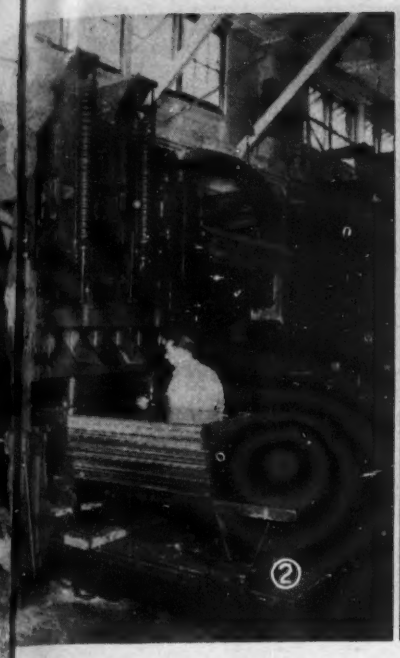
Fig. 4 shows overall view of the production line and conveyor setups which serve five Unionmelt welding stations where each of five Type U heads makes 80 complete welds per hour—total of 400 containers per hour. Figs. 5 and 6 show rear and front views respectively of the Type U heads, each of which is mounted on a Type CM-21 tractor-unit. Each head is served by a high frequency starter which eliminates the necessity of placing a ball of steel wool in the groove to start the arc for each weld. Hobart generators are used to supply the welding current.

Actual welding is done at rate of 75 in. per minute. Each 25-lb coil of welding wire will weld some 600 containers. The granular flux or melt material feeds down over the weld area from the hopper shown in Figs. 5 and 6. Excess melt material is recovered by an individual vacuum recovery unit for each machine. Operator in center foreground, Fig. 6, is manipulating the suction hose from the recovery unit to pick up excess flux, which subsequently is re-used.

Two Operators Per Station

Two operators work at each welding station. While one is starting the machine and picking up excess flux, the other is removing a completed container from the second fixture and setting up another to be welded. In this manner, each welding head is kept in almost continual operation by use of the dual fixtures.

The welding jig is somewhat unusual. The tubular container section goes on a welding arbor which is water cooled and which carries a copper backup strip. A throwable device in the form of knife edges fastened to a bar swung over the



seam is used to locate the seam in proper position on the welding arbor. Then a edal operated clamping mechanism starts ries of operations which

—raises a support for the welding arbor

—hits an air valve which then

—turns air into a line

—actuating the rear clamping jaws.

Pressure on another pedal inflates a ond air line which moves a front side amp and a front edge clamp into position. Starting and run-off tabs are then oved up into position in line of the weld. These tabs must adjoin the beginning and end of the container weld closely or a burnt spot will be produced at each end of the welded seam. The jig is designed so as to close up the seam tightly.

As soon as a container has been welded, the head is moved over to the adjoining jig which has just been loaded. This container is then welded while the first jig is unloaded and reloaded.

Fig. 7 is a view of a portion of the inspecting benches with their roller conveyor feeding lines. Note that two operators work at the inspection table. One or the other is sure to catch any defects,

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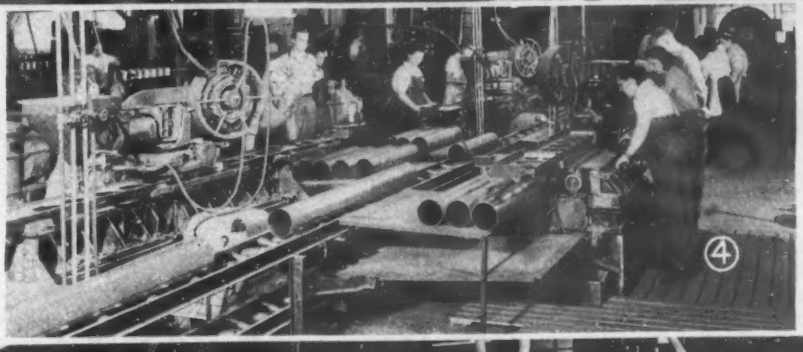
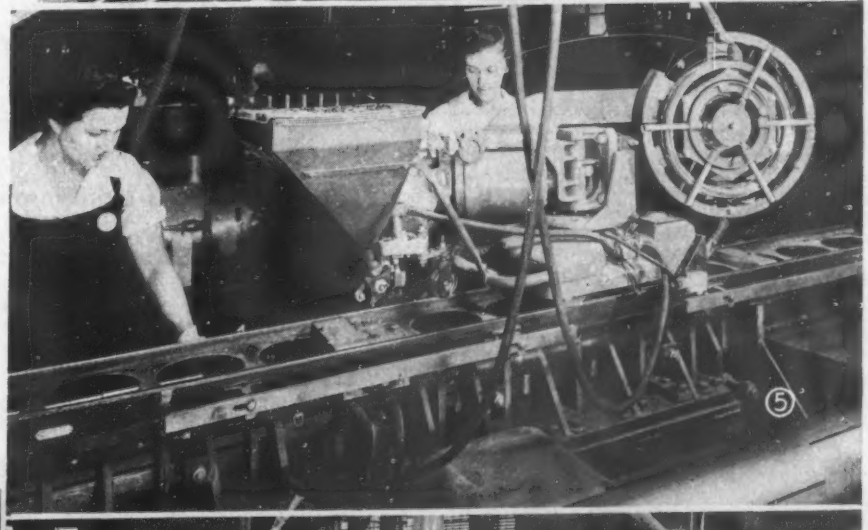
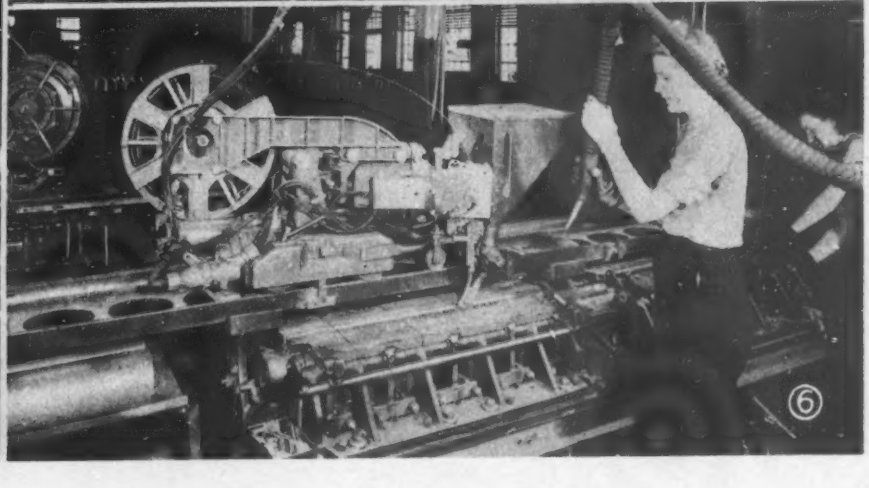
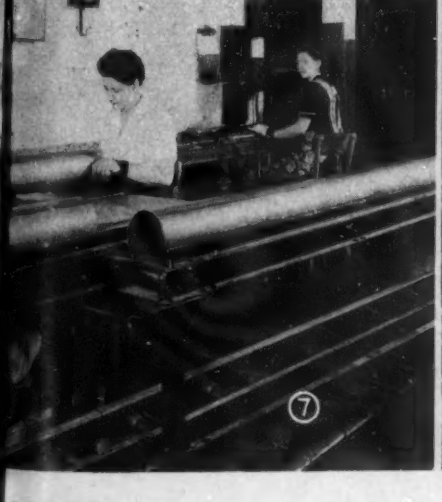
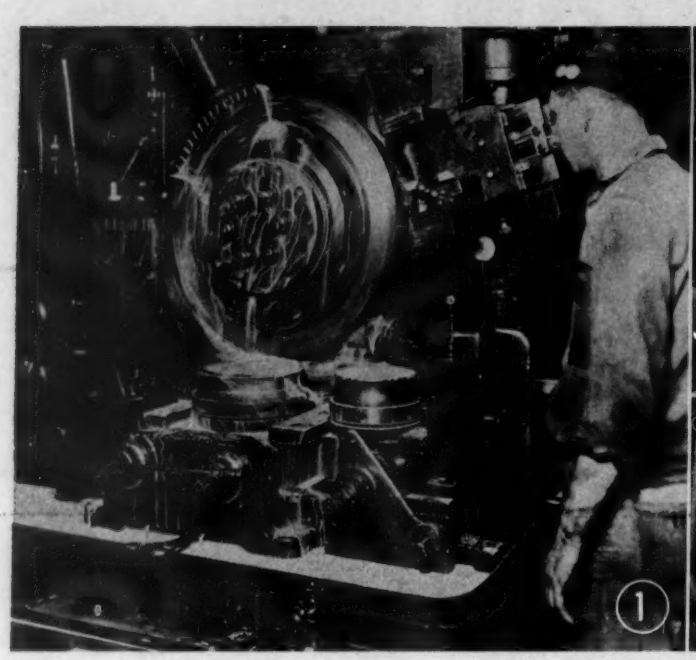
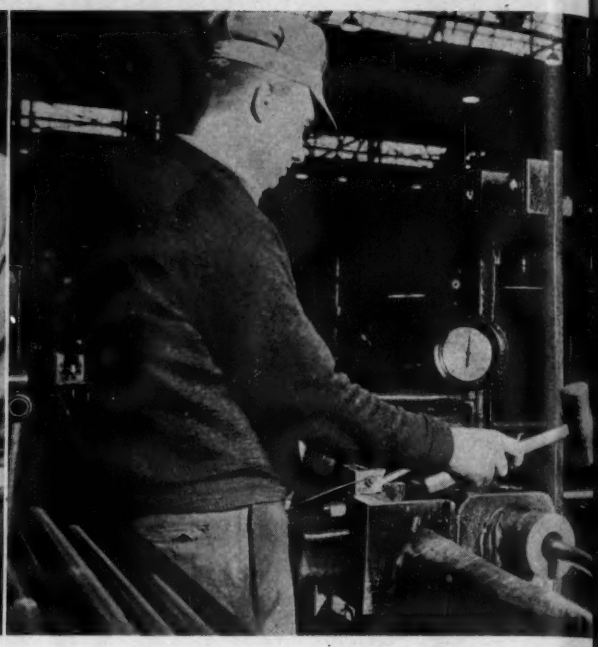












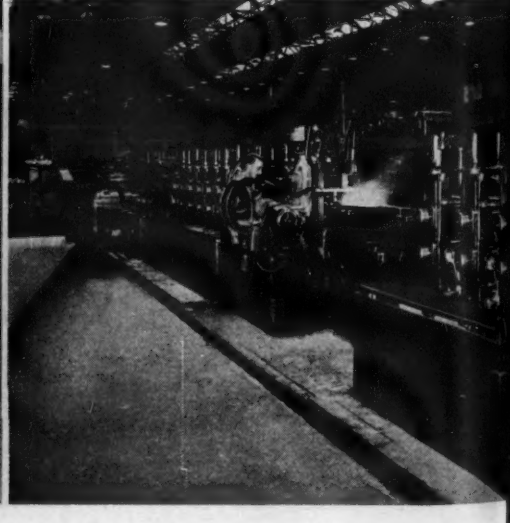
Produces Over 19,000 Miles of ELECTRIC

Two mills at Ohio plant operated by Babcock & Wilcox Tube Co. make tubes 3/4 to 4 in. diameter at rate of 4000 tons a month. Scale-free skelp is fed into sizing mill where by mechanical control it is brought to the required thickness. Buttwelding ends together affords continuous operation of mill. Rigid inspection and testing is maintained

SINCE the completion of the electric resistance welded tubing plant for the Defense Plant Corp. at Alliance, O., and its operation by the Babcock & Wilcox Tube Co., well over 100,000,000 ft of carbon steel pressure and mechanical tubing has been produced. In designing the plant, provision was made for eliminating the usual variables that plague the tube welder, such as the strip thickness and width. Two electric weld mills are housed in the 665 x 100-ft main bay. No. 1 mill produces tubes ranging from 3/4 to 2½-in. diameter, in gages from 0.049 to 0.156-in., and at speeds ranging from 50 to 200 fpm. The No. 2 mill is designed to produce tubes ranging from 2 to 4-in. diameter, in 0.065 to 0.259-in., at speeds from 30 to 120 fpm. Both mills and their accessory equipment have a capacity of about 4000 tons of tubing a month, depending upon the kinds and sizes made.

Hot rolled skelp, in coils, is used for about 95 per cent of the plants' production of tubing, and about 5 per cent of hot rolled pickled and oiled or cold rolled strip, makes up the total. A storage space for approximately 5000 tons skelp ha been provided. The coils are stored o edge and in tiers of three or more high and are handled by a crane hook of mul tiple length.

Skelp is run through a scale breake under tension onto a recoiler. Thi



WELDED TUBING

breaker unit includes a jib crane, a multiple coil box, feed rolls, scale breaking rolls and recoiler with coil discharge mechanism. After the coil of skelp has been recoiled, it is back-spun by reversing the recoiler to open the individual wraps of the coil, and is then ejected from the recoiler into an upender which deposits the coil on a conveyor running to the pickle house.

Two 284-hp Babcock & Wilcox Co. Type FF No. 12 boilers are housed in an 85 x 35 ft boiler house extending beyond the main bay at the north end.

These boilers supply steam for heating the pickle bath, rinse, and for miscellaneous heating. They are coal fired with single retort underfed stokers. The ash is handled by a conveyor system.

In the pickle house, the individual wraps of the coils are further separated with staples to prevent surface contact

(*Please turn to Page* 144)

Fig. 1—*Welding head. Beryllium copper electrodes contact upper surfaces of formed tube on either side of seam*

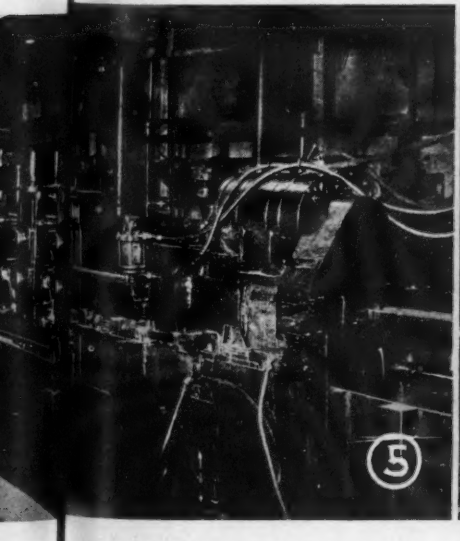
Fig. 2—*Hydrostatic test pressures are in accordance with specifications*

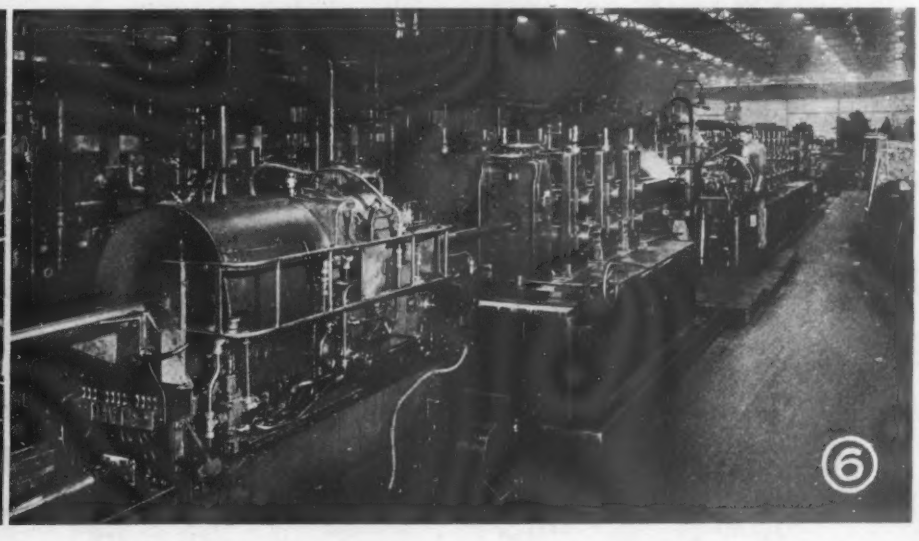
Fig. 3—*General view of shop. Approach to bright annealing furnaces in center, forming and welding at each side*

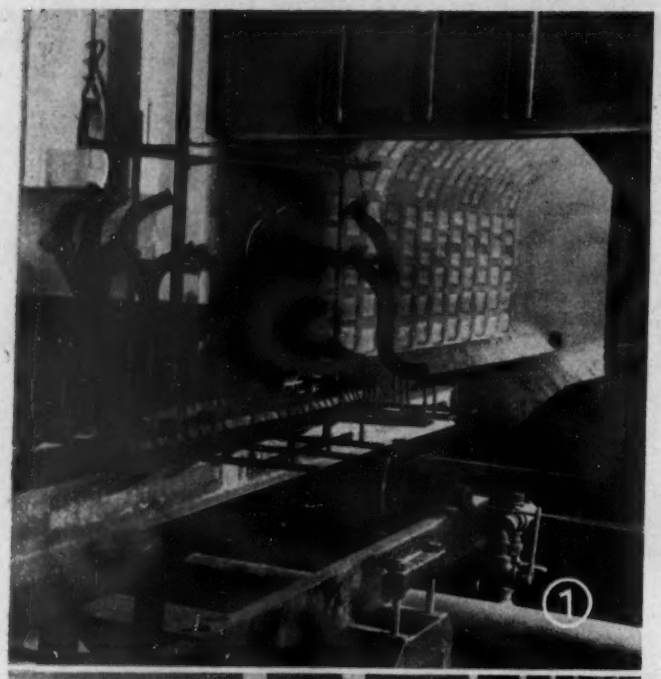
Fig. 4—*Cold sizing mill for bringing pickled skelp to required thickness*

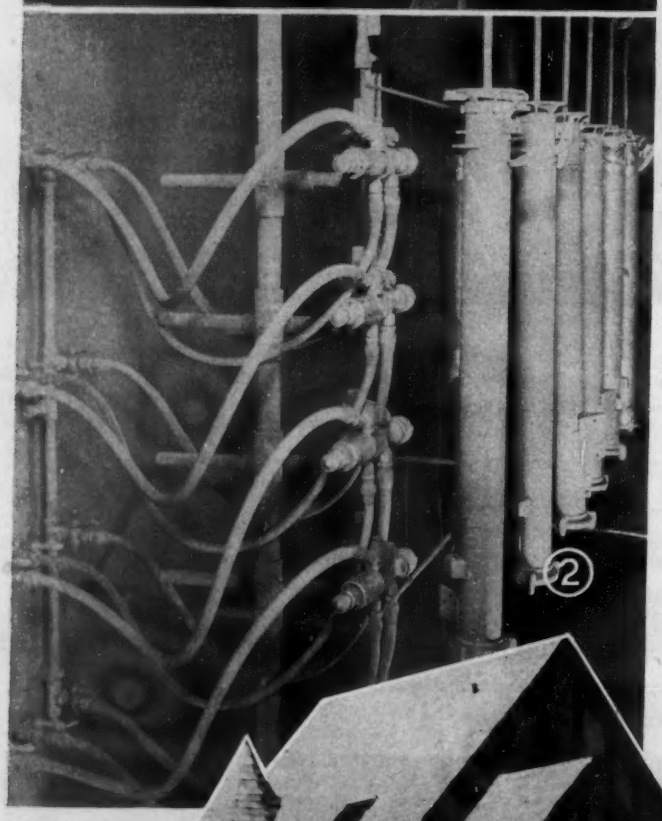
Fig. 5—*General view of forming mill and welder*

Fig. 6—*Flying rotary cutoff. Welding and forming rolls in background*









Modern Metal Protection

A symposium

Reported by
Dr. ALLEN G. GRAY
E. I. du Pont de Nemours & Co. Inc.
Cleveland

Relative merits of various protective finishes are being pondered by engineers and production men now planning the design of many new metal products. A basis for comparison of several methods of metal protection is provided by these data presented by seven authorities before the Cleveland Section of the Electrochemical Society wherein properties, advantages and limitations and general possibilities for several types of corrosion protecting finishes are discussed

THOSE now planning the design of many new metal products inevitably will consider the relative merits of various protective coatings and finishes for some products. A basis for comparison of methods and coatings, as well as highlights of developments occurring during war period, is afforded in the seven short articles which follow.

Protection of Metals for Industrial Process Piping

By L. D. VAN DE BOGART
Crane Co.,
Chicago

TWO primary criteria govern the use of protective coatings, namely, is the protective coating compatible with its environment—that is, will it protect the underlying surface in the medium in which it is to be used and, second, what constitutes the proper base material on which to apply it. Other factors which may influence the choice of protective coatings are the nature of the assembly to which the coating is to be applied and "cost vs. feasibility" factor.

The "cost vs. feasibility" criterion may arise as a result of the necessity for a decision between the use of a protective coating or a corrosion resistant material of construction. In the construction of an assembly, it is sometimes found that the most logical solution may be in the use of a combination of corrosion resistant materials for certain parts of the assembly and protective coatings for other parts of the same assembly. Thus, as an example, certain items such as screw parts, springs, etc. can be constructed of materials resistant to the corrosive action of their environment, whereas other parts of the assembly may be fabricated of cheaper materials and protective coatings applied. Another point to be remembered in the "cost vs. feasibility" factor is that parts must be accessible to the application of protective coatings.

Protective coatings may have an important influence in changing normal electrolytic cathode-anode relations. Porosity often governs the use of many sprayed coatings. In certain cases the environment may seal off pores in coatings. The use of protective coatings in piping may present special problems due to the requirements for joining and protection required in the joining area. However, the use of special gaskets may somewhat simplify the problem. It is generally advisable to avoid sharp corners in the use of all protective coatings.

Electroplating definitely presents certain advantages in the application of protective metallic coatings. An example is nickel plated pipe interiors. Such nickel-plated pipe has been produced; it can be hot bent and cold extruded, and is believed to present a promising future, particularly for use in the construction of chemical process equipment.

Thermosetting phenolic resins, applied on cast iron pipe, have in many cases been successfully substituted for brass and bronze pipe. Stainless steel heat exchanger tubes coated with phenolic resin have been satisfactorily used in petroleum refinery applications. While it is true that many of the uses of protective coatings were dictated by the war emergency, a great number of the applications have been so successful that many industries are planning to continue to use protective coatings even after suitable corrosion resistant materials of construction again become available.

Anodic Treatment of Aluminum

By J. D. EDWARDS
Aluminum Research Laboratories
New Kensington, Pa.

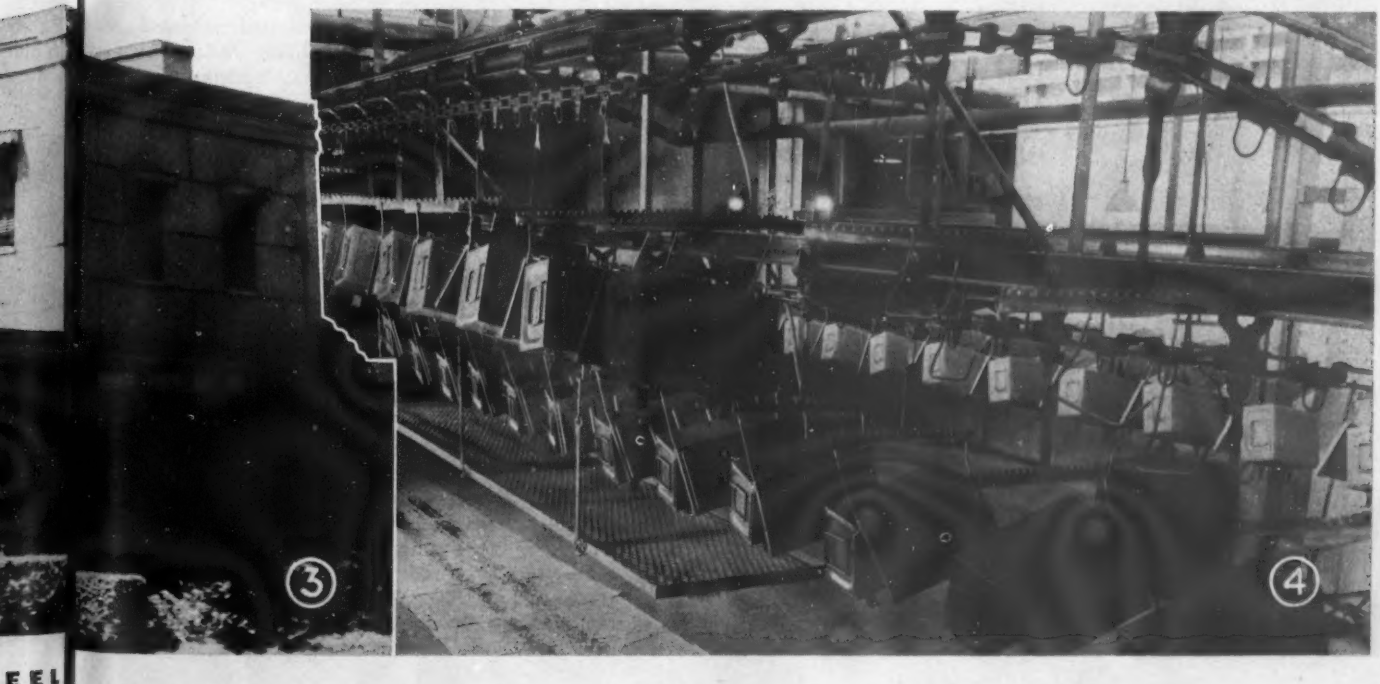
ANODIC coatings on aluminum have gained an important position in the field of modern metal protection. During the war, they were used extensively to pro-

Fig. 1—Engine exhaust stacks coated with corrosion and heat resistant enamel are about to be rolled into a furnace for firing at 1600° F. In use, the stacks will not encounter temperatures above 1200° F

Fig. 2—These tubes are being sprayed electrostatically whereby finish is applied uniformly front and back

Fig. 3—All-steel houses are proving durable and economical. This porcelain-enameled house, built in 1933, is as good today as when built. Maintenance expense has been insignificant

Fig. 4—Steel boxes, just sprayed, are deteared electrostatically by passing over the grid as shown



tect aircraft and military materiel against the hazards of unusual and severe service conditions. In the peace we now are building, they promise to make aluminum more useful by providing hard, wear-resistant surfaces readily cleaned, surfaces which help protect against corrosive attack, which present an attractive appearance, and which may be given an endless variety of color for many applications. These anodic coatings are substantially aluminum oxide, 0.1 to 0.6-mill in thickness, and are made by electrolytic oxidation in solutions such as sulphuric, oxalic or chromic acid.

Aluminum itself occupies a position high in the electromotive series of metals. However, its chemical activity is sharply reduced by the surface formation, spontaneously, in air, of a thin self-healing film of aluminum oxide. The original experiments in anodizing were probably carried out for the express purpose of improving and enhancing the characteristics of this naturally occurring oxide film and making it thicker. The aluminum oxide film, being nonmetallic, is a comparatively inert material chemically, and thus provides an excellent means of retarding the corrosion of aluminum.

The anodizing process can be considered the opposite of plating. The object is the anode and the nascent or highly reactive oxygen liberated there reacts with the aluminum to form the oxide film. The exact thickness of oxide formation depends largely on the conditions of the electrolysis.

Aluminum oxide produced by the electrolysis of chromic acid solutions are relatively thin. Anodic films formed in sulphuric acid solution are somewhat harder and lighter in color than films produced in chromic acid, closely adherent, and relatively thick. Films range from 0.0001 to 0.0008 in. with a thickness of about 0.0004 in. obtained in a normal commercial cycle. To improve resistance to corrosion and abrasion, sulphuric acid coatings are sometimes sealed in boiling water or a hot dichromate solution where a yellow color is not objectionable and where additional resistance is desired. In this manner, the porosity of the oxide is markedly reduced and the surface is effectively sealed against further inclusions. Oxalic acid coatings have a grayish cast and are of the same order of thickness as those formed in chromic acid.

Protective powers of the coating depend in an important way on the thickness and continuity of the coating. When aluminum alloys are anodically coated, certain alloying constituents may be selectively attacked, to the detriment of the film continuity. An understanding of the structure of anodic coatings is important for it permits selection of alloys best adapted for the intended application. These anodic coatings have a fine porosity; the pores extend from the surface of the coating to a thin barrier layer of oxide about 0.00003-mm in thickness at the surface of the metal. These pores are too fine to be viewed with the optical microscope, but their presence and behavior have been demonstrated by other methods. Now, with the electron microscope, visual evidence of their size and distribution has been obtained. There may be a billion or more of these pores per square inch of coating. Their effects upon the protective powers of the coating can be minimized by the sealing operation. These pores admit aqueous solutions but are too fine to admit solid particles. They give the coating high adsorptive power and advantage of this can be taken in many ways, as for example, the coloring of the coatings by dye adsorption.

Films of aluminum oxide which comprise the anodized coating have the unusual property of adsorbing organic dyes and mineral pigments. By immersing in suitable solutions anodized aluminum may be colored or dyed in an exceedingly attractive manner. In choosing the proper dye, fastness to both sunlight and artificial light, and to the effect of perspiration, heat and chemicals, are some of the factors to be considered, besides actual color. In cases where extreme durability of color is of vital concern, inorganic pigments are often advisable since they are less susceptible to other changes. Of the three processes already discussed, coatings produced in the sulphuric acid electrolyte are the thickest, most adsorbent and, as a result, are generally considered to be the most adaptable to dyeing.

Fig. 5a—(above) Normal or pocket-type porous chromium at X-100; 5b (below) channel-type porous chromium at X-100 magnification

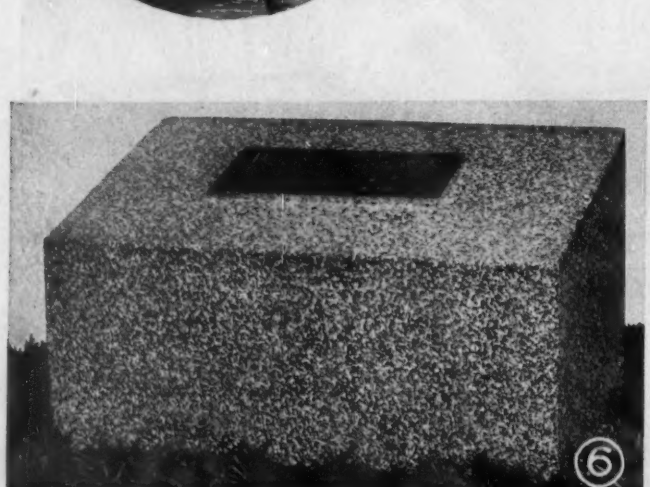


Fig. 6—Steel tomb stones? Porcelain enameled steel tomb "stones" like this one are said to be economical and durable

Automotive Plating Survey

By R. C. OLSEN
Ternstedt Mfg. Division
General Motors Corp.
Detroit

THE last 3½ years of producing for government have made the automobile industry and others, "specification conscious". There is another customer to satisfy, the owner of a four-year old automobile, who has seen the ravages of corrosion daily.

A survey was carried out on the condition of a number of plated parts on 1219 cars that had seen one or two winters of service. This survey included only cars that were built before specifications on the so-called "defense plate" were adopted by the automotive industry. The cars represent the entire field of automobile manufacture and give a picture of the state of automobile hardware in general. Percentages shown in Table I, are based on averages of numerical ratings and mean per cent perfect, corrosion-ifree surfaces of automotive hardware.

A number of facts are obvious from a study of figures given in Table I: Steel parts need more protection; parts below the belt-line are subjected to more se-

vere exposure; the average owner assumes that his ornamental hardware has been permanently protected in manufacture.

It is a well demonstrated fact that even with the best plate, the owner still must exercise reasonable care if he is to preserve the finish which originally came on his car. Roof exposures have graphically demonstrated that periodic cleaning and oiling will prolong the life of hardware almost indefinitely, even under conditions of severe exposure. This point is recognized to the extent that, in most specifications, the method of preparation of samples for corrosion testing is closely detailed.

In order to give the automobile manufacturing plants a chance to overcome these plating deficiencies the General Motors plating specifications have been revised as shown in Table II.

TABLE I
GENERAL STATE OF AUTOMOTIVE HARDWARE
Mean Per Cent of Perfect, Corrosion-Free Surfaces on 1219 Cars

	Per Cent
Bumper Bars	66.5
Bumper Guards	61.0
Grilles and Catwalks	68.0
Radiator Ornaments	79.4
Door Handles	80.0
Mouldings	79.4
Hub Caps	81.0
Window Channels	69.0
Emblems	71.0
Trunk Hinges	68.8
Trunk Handles	64.1
Steel	65.5
Zinc Die Castings	71.7
Copper Alloys	81.0

TABLE II
REVISED GENERAL MOTORS PLATING SPECIFICATIONS

Class	Minimum Nickel	Minimum Total	Minimum Chromium	Salt Spray Hours	Base Metal
AAAA	0.0007	0.003	0.000015	144	
AAA	0.0006	0.002	0.000015	96	
AA	0.0005	0.0015	0.000015	48	
A	0.0003	0.001	0.000015	32	Steel
AB	0.0002	0.00075	0.000010	24	
B	0.0002	0.0005	0.000010	16	
AA	0.0003	0.0003	0.000010	..	
A	0.0002	0.0002	0.000010	..	
AA	0.0005	0.0015	0.000010	48	
A	0.0003	0.001	0.000010	32	Die Cast
AB	0.0002	0.00075	0.000010	24	Die Cast
C	.....	0.0002	0.000010	..	
		Zinc or Cadmium			
A		0.0005		48	
AB		0.0002		32	
B		0.00015		24	
C		0.0001		..	

Chromium Plating

By JOHN POOR
Van der Horst Corp.
Olean, N. Y.

ALTHOUGH the practical value of "hard chromium" plating has rapidly increased throughout the past 10 years, the war has proved it to be the greatest salvage medium as well as the greatest life prolonger of equipment. The three outstanding characteristics of chromium are its hardness, its low coefficient of friction and its resistance to abrasion and wear. It is generally believed that the low coefficient of friction and wear resistance of the chromium are factors which contribute to longer life of tools.

It would appear that chromium offers something approaching the ideal, as a metal with which to surface the cylinder walls of internal combustion engines, but the most difficult problem is not solved by processing such cylinders with ordinary dense chromium. The surface of chromium, as it is customarily applied by electrolytic processes, is so slick that it is not wetted by oil.

Commercially available lubricants will actually run off the chromium surface; a drop of oil will neither stick to it nor spread out on it. This is of importance because, without lubrication, the cylinder and piston assembly of an internal combustion engine will not function. They seize. The guard against this, some oil must exist between all points on the contacting surfaces of the cylinder wall and the piston and its rings. In modern high-performance engines, splash feed lubrication is relied upon to provide this protective film. Such a system depends upon the oil being splashed on the lower reaches of the cylinder wall and on the skirt of the piston, ultimately being carried upward to the vital ring travel area.

The term "wettability" has been applied to surfaces and to oil to define that property of either which affects the rate of oil dispersion. Although, as stated above, "wettability" is, to a certain extent, a function of both oil and surface, aside from the varying characteristics of oils, surface geometry or profile of the surface to be wetted is a considerable factor. On a smooth, plane surface an oil drop reaches a state of equilibrium at which it will neither spread nor recede. On a porous surface, such as that produced in porous chromium, an oil drop may cover from fifty to several hundred pores, or crevices, in the surface depending on the degree of porosity, Fig. 5a. Thus, such a surface has that highly desirable characteristic, as a material for cylinder walls, namely, "wettability."

Two distinct types of porosity can be produced in the chromium plate. One is the pocket type (Fig. 5a), which has been widely used on diesel cylinders. Thousands of the engines that power the Navy's submarines and smaller surface craft, as well as those used for auxiliary power on its larger ships, have functioned with this type of porous chromium on their cylinders. A more recent development is the channel type of porosity, in which intersecting channels surround the plateaus of bearing metal (Fig. 5b). This type has found use in such high-speed, high-output engines as those of the radial air-cooled design which were used in tanks and war planes. The porosity is produced by anodic treatment in chromic acid solution, although other electrolytes can be used. Experiments have shown that the oil film on the plateaus of both normal and channel types of porous chromium is very thin, perhaps only a few molecules thick. The mechanism of oil spreading on porous chromium is apparently capillary in character, a phenomenon not observed on steel and cast iron. The greater rate of dispersion on channel type chromium surfaces can perhaps be attributed to the system of canals or arteries which reduce the distance to be traveled by capillary action.

Considerable attention has been given to methods of surface preparation of engine cylinders prior to chromium plating. Electropolishing and vapor-blasting, using material of the order of 2000 mesh, are two promising methods. These methods have the advantages of reaching recesses and effectively removing edges. The benefits of electropolishing prior to heavy electroplating have been stressed by Faust (*Electroplaters' Society Monthly Review*, Sept. 1944).

These benefits are due to the fact metal is removed without accompanying mechanical work, which introduces heat effects, strains, tearing and deranging of the crystal structure of surface layers. Vapor-blasting methods have the advantage that they can be used on cast iron parts that cannot be satisfactorily electropolished. After plating, honing is used to retain the straightness and roundness of the cylinder bore. A promising postwar field for porous chromium is the direct application to aluminum cylinder walls.

Porcelain Enamels

By G. H. McINTYRE
Ferro Enamel Corp.,
Cleveland

PORCELAIN ENAMEL is a highly corrosion resistant inorganic substance. Generally, it has been used commercially not so much because of this property but for the reason that it is colorful, durable, easily cleaned and economical to apply. Thus, it has found its largest usage as a finish for such items as stoves, refrigerators, washing machines, cooking ware, bath tubs, lavatories, and electric light reflectors. Its possibilities as a functional finish, strictly for high corrosion resistance, have only recently been fully recognized and exploited.

Porcelain enamel is a completely inorganic substance which, by composition, is a glass that can be bonded by a fusion process to a metal base—usually

iron. It should be distinguished from the organic or paint "enamel," which substance is strictly organic in composition and is not matured by fusion at high temperature.

To manufacture porcelain enamel, refractory substances, such as feldspar and powdered quartz, are intimately mixed with fluxes, such as cryolite, borax and fluorspar, and oxidizing agents such as saltpeter. The mixture subsequently is brought to quiet fusion in an open hearth-type fuel fired furnace. This is the glass forming stage of the process. The molten glass is discharged from the smelter into water. This sudden cooling causes the molten glass to break into millions of friable particles, granular in form, known as "frit."

To prepare the frit for application to the metal, it is first ground in pebble mills with water and clay to a fine suspension of the glass particles in the water. The special clays used in the process act as floating and suspending agents. The milled enamel which has a consistency about like thick cream may be applied to the metal base either by dipping or spraying. After this, this water is evaporated by inserting the ware in a hot air drier. The article with its bisque coating is placed in a muffle-type fuel fired or electric furnace and brought to a temperature of approximately 1550°F. Under these conditions, the glass particles remelt, forming a homogeneous layer of glass which bonds to the metal. Subsequent coatings are applied in similar manner, each layer fused and bonded to the layer of glass underneath.

Enamels are formulated to yield properties suitable to the use for which the enameled article is designed. Uniform specifications cannot be applied to all enamels for all purposes. Enamels can be made highly resistant to all organic and inorganic acids (except hydrofluoric) and to normal alkaline solutions. Porcelain enamels are not resistant to highly concentrated caustic solutions at boiling temperatures since these solutions are excellent solvents for silicates. All enamels are not made acid resistant because, in general, these types of enamels are more difficult to apply, which means relatively higher costs in the process. Acid resistance does not always guarantee that the enamel will be suited to the conditions of service. For example, weather and water-resisting enamels may be also acid resisting, but all acid resisting enamels are not weather and water-resistant.

Enamel Low-Carbon Steel

During the war, many new types of corrosion resistant ceramic coatings or porcelain enamels were developed for ferrous metals. It was found that many articles formerly manufactured from heat resistant and corrosion resistant metal alloys could be manufactured at lower costs from available low carbon enameling stock and mild steel (1020) and coated with one or two applications of special enamels. Frequently these enameled items were found to be better than the original made from metal alloys. This was particularly true for engine exhaust systems of airplanes and tanks.

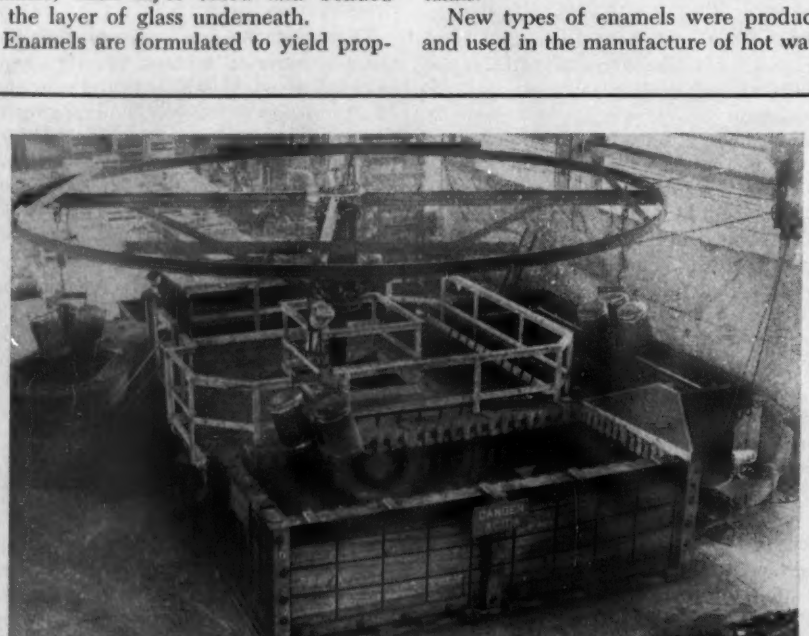
New types of enamels were produced and used in the manufacture of hot water storage tanks for government and private housing. Enamels completely resistant to the solvent action of hot water under pressure had not been discovered prior to war. Such enamels are now available and undoubtedly will be used in the postwar period now at hand. Other examples of applications of enamels for corrosion resistance are "glass-lined" chemical equipment, "glass-lined" pipe used successfully to resist hydrogen sulphide corrosion in the natural gas fields of Texas, and Army tent hoods.

Another interesting new development of porcelain enamel coating during the war was the manufacture of home electric stove heating elements from enameled tubing as the medium for containing the hot electric wire. These enamels were of a highly infusible type and were durable at high temperature. This application permitted replacement parts to be manufactured during the war even though nickel tubing was no longer available.

Porcelain enamel has often been criticized as being unsatisfactory for corrosion resistance because it is subject to damage by impact. It must be remembered that enamel is a glass and, if treated as such in handling, will remain most durable. When enameled articles are handled properly to prevent mechanical damage, long life and excellent protection of the metal surface will result.

The average manufacturer of enameled articles has thought of porcelain enamel in terms of its beauty and average mild corrosion problems, and does not realize that for chemical and complete weathering resistance, the surface of the metal must be completely covered. Hence, articles are sometimes enameled and put into service with minute spots of the surface not covered. Enamel does not offer any electrolytic resistance to corrosion as do some types of metallic coatings, and corrosion will occur rapidly in such unprotected areas. However, when the surface of the metal base is completely covered by the proper type of enamel the surface will withstand, indefinitely, such tests as salt spray, acid solution (except hydrofluoric), and weathering.

In many applications it may be found to be an ideal corrosion resistant coating for iron and mild steel. It is also adaptable to copper and aluminum and has been used to advantage on these metals.



MERRY-GO-ROUND CLEANING: Preparation for painting of high pressure tanks produced in quantity for various purposes is speeded by this system devised at American Locomotive Co. Four vats, containing an acid dip, a neutralizing agent, water and a drying unit are placed at 90° points on a circle. Above them, a circular framework with four chain hoists carries tanks in clusters of three. Clusters remain in each vat for about 10 min and then are automatically raised, moved to the next station, and lowered into the vat. The 40-min circuit permits treatment of 18 tanks per hour, or a total of 360 tanks per 20-hour day, and requires the attention of only one operator

Rubber Lined and Rubber Covered Equipment

By H. C. KLEIN
B. F. Goodrich Co.
Akron, O.

AT TIME OF Pearl Harbor, the linings used in equipment for handling corrosive chemicals were nearly all natural crude rubber recipes. It is true that some synthetic rubber linings such as GRM and thermoplastic linings such as Koroseal were in use to a limited extent. The rubber industry had practically no background on the use of GRS rubbers

(*Please turn to Page* 172)

Trends in Metal Cutting Are Clearly Indicated By Cincinnati ASME Sessions

Refinements in cutting tools inspire redesign of machine tools which in turn inspire revision of thinking among engineers

By GUY HUBBARD
Machine Tool Editor, STEEL

THAT the engineering profession today is very much "on its toes" to see what is new in the art of cutting metals, was proved conclusively by the number and by the caliber of the papers dealing with that art, presented at the Fall Meeting of the American Society of Mechanical Engineers at Cincinnati, Oct. 2 and 3.

Anyone who might have had an idea that ultimate peaks in tool development and in machine tool design were reached during the war, would have had their ideas changed by attending that meeting. It is true that the war did stimulate the scientific approach to solution of production problems. Many big problems were solved. However, bigger problems lie ahead and machine tool engineers and tool engineers are going to attain new and higher peaks of development in their solution.

One thing which could be gathered from practically all of the papers dealing with machine shop practice is that while theory is important, progress comes through constant practical experimentation with careful keeping and evaluation of records of the results of those experiments. Thomas A. Edison once said that invention is one part inspiration and ninety-nine parts perspiration. As a matter of fact, the search for the ideal cutting tool to meet any given set of conditions is as tough or tougher than Edison's classic search for the right fiber for the incandescent lamp filament.

Joseph F. Allen, project engineer, Warner & Swasey Co., Cleveland, brought this out when he demonstrated that with a relatively few variables, a single point turning tool research project may involve something like 165,000,000 possible results. The variables will include slight variations in the material machined; in the tool material; in tool angles; in coolant; and in speed and feed conditions.

I was reminded of the evaluation of a horse, where the purchaser thought he was getting a bargain by paying on the basis of one cent for the first nail in the horse's shoes, two for the next; four for the next, eight for the next; and so on. Figure it out for yourself sometime. You will be fully as surprised as is one who approaches a metal cutting research job without foreknowledge of what he is getting into.

Mr. Allen showed some interesting photographs of a test setup at his company. This is based on a heavy duty turret lathe whose spindle is driven by a variable speed motor of 50 hp. which for short periods is capable of delivering 100 hp. This test machine is capable of recording cutting pressures on the tools so that effects of various shapes can be determined. Mr. Allen and other speakers mentioned that when similar tests are made under rule-of-thumb shop conditions, their benefits are lost because records seldom are kept. When a good result is attained the "why" is not discovered.

Following this same line of thought, Dr. M. Eugene Merchant, physicist, and Norman Zlatin, research engineer, Cincinnati Milling Machine Co., Cincinnati, revealed how they have obtained basic data on continuous chip cutting by a tool dynometer setup in connection with facing the end of a steel tube. What they call "orthogonal cutting" is one where a straight cutting edge lies perpendicular to the direction of motion of the tool relative to the work. Many common types of machining approximate this.

Having studied the geometry of chip formation and the forces involved, these two investigators have developed a highly ingenious series of nomographs or charts. These cover cutting ratios; shear angles; shear strains; velocity of shear; coefficient of friction; shear stress; frictional force; and overall efficiency of metal removal and work done in cutting. These are too numerous and complicated to cover here, so I recommend that those seriously interested get copies of the printed paper from the ASME. My impression is that it represents a major contribution to the cause.

Carbide Milling Cutters

Dr. A. O. Schmidt, research engineer, Kearney & Trecker Corp., Milwaukee, delivered a paper on "Data on Production Runs with Carbide Milling Cutters." The basis for this paper was the milling of sides and bosses of SAE 4340, 200 brinel, forged steel aircraft wing hinges. The job was done in a duplex Milwaukee miller with carbide tools and tabulations were not allowed to interfere with production.

End results indicated that a cutter with solid carbide blades wedged into the cutter body at 15° positive radial rake angle and provided at the cutting edge with a negative face of small width: (1) Machined more pieces between grinds; (2) used cemented carbides more economically; (3) operated with less vibration and deflection of the work; consumed less power; (4) and consistently produced an acceptable finish with little or no burr.

As an illustration with this report, I present the graphical representation which Dr. Schmidt made of the various test results which he attained on this project. This will give some idea why the benefits of ordinary hit-and-miss tests —without proper "bookkeeping" have in the past been lost. It also may inspire similar graphical evaluation by other investigators. Incidentally, I have seen Dr. Schmidt's unique positive-negative rake cutter perform and so can assure you that it is no abstract dream.

During the meeting in Cincinnati, I was greatly impressed with the possibilities of slow motion moving pictures and stereoscopic photography in metal cutting research. Neither technique is new, in fact stereoscopic photography is almost 100 years old. However, I doubt if the possibilities of either have more than been scratched.

Several movie shorts of grinding and cutting operations were shown in connection with papers at the Cincinnati meeting. I personally learned more about what actually goes on in a centerless grinder, from a slow motion movie, than I have ever from watching the machines in actual operation. This film was used in connection with the paper, "Rounding Effect in Centerless Grinding," by Albert H. Dall, assistant research director, Cincinnati Milling Machine Co., Cincinnati.

This end-on view of work and wheels in action brought out the fact that the regulating wheel runs with the work piece just as though it was geared to it. However, instead of driving the work (that is, revolving it) as many people suppose, the guide wheel actually does act as a brake. The revolving power comes from the fast running grinding wheel. Incidentally, Mr. Dall showed how peculiar and undesirable generating of shapes other than true rounds can result when the work rest blade is not properly located in respect to the wheels. Apparently just as much attention must be paid to geometry in setting up a centerless grinder as is true of various other machine tools. Someone once described a machine tool as "geometry in action". That is indeed an apt description.

The subject of stereoscopic photography as applied to machine shop practice was introduced by Dr. M. Kronenberg, research engineer, Cincinnati Milling Machine Co., Cincinnati, in connection with his paper on "Analysis of Initial Contact of Milling Cutter and Work in Relation to Tool Life." To make clear

(*Please turn to Page* 184)

Applies TWIN-MOTOR DRIVE To Tandem Sheet and Tin Mills

CHICAGO regional meeting of the Association of Iron and Steel Engineers, held at the Del Prado hotel, Oct. 1, and constituting the fourth in the association's series of six district conferences, attracted an attendance of approximately 400 members and guests. Following the two technical sessions, an informal dinner was served.

In contributing a paper on "Development and Application of Twin-Motor Drive", G. E. Stoltz, manager, steel mill engineering department, Westinghouse Electric Corp., East Pittsburgh, Pa., asserted that this type of drive has developed into a modern method of improving the manufacture of steel. First main roll drive installation using twin motors was made in 1930 on a 54-in blooming mill at the South Chicago Works of Carnegie-Illinois Steel Corp. Recently there has been an increase in interest in use of twin-motor drive for various applications.

After describing various twin-motor drives on blooming and slabbing mills, as well as a plate mill, Mr. Stoltz stated that their most satisfactory operation undoubtedly will influence steelmakers to use this drive not only on other mills of the same type but other types. His company already is building twin-motor drives for continuous sheet and tin plate mills.

Its introduction to a tandem cold mill is being made by Bethlehem Steel Co. at Sparrows Point, Md., where dc pinion drive motors are to be used on stands Nos. 1 and 2 and twin-motor drives with offsetting gears will be used to individually drive the upper and lower working rolls on stands Nos. 3 and 4 of a 4-stand 56-in sheet mill.

A similar application is being used on a 5-stand tandem tin plate mill to be installed by Weirton Steel Co. First three stands are to be driven by dc motors with pinion housing, and last two stands will be driven by twin-motor drives through offsetting gears. Prime reason for using twin-motor drive on finishing stands is different from that where it is used for a large blooming or slabbing mill or even a plate mill."

Continuous cold strip mills are being installed at such high-delivery speeds that it becomes important to keep the peripheral speed of the upper and lower working rolls the same at all times. Thickness of the metal in these finishing stands is small, and the metal becomes brittle by the time it reaches the delivery end of the mill. On the finishing end of a mill rolling thin gages there is considerable pressure between rolls even with no metal in the mill. With any difference in working roll diameter on a pinion driven mill this would make the rolls grind each other and cause their surfaces to become rough. This is avoided with separate roll drives.

Bethlehem at Sparrows Point is initiating use of twin motors on the main drive of two 4-high temper pass mills. Power required is only 400 hp, and by making a special designed motor it is possible to eliminate the offsetting gears and connect the motor armatures direct to the working rolls without introducing any particular angularity in the driving spindles.

Still another type of application for a twin-motor drive is being made on the forming rolls of a tube mill, according to Mr. Stoltz. In this case, individual gearmotors are used to drive the top and bottom rolls separately. Reason for this is that in forming skelp into pipe the pitch diameter of the rolls varies as the skelp takes its cylindrical shape.

Another application for a twin-motor drive is use of individual motors to drive top and bottom roll on an electrolytic tin plating line. It is important not to scratch the surface of the strip, particularly after it has been plated. If a pair of rolls are geared to each other, it is essential that they be kept at exactly the same peripheral speed, otherwise any difference in speed will scratch the tin plate. To avoid this, the motors used to drive the plating rolls are installed in pairs, one to drive the upper roll only and the other the lower roll. These dc motors are designed with heavy dropping speed characteristic so that they will slow down if one should tend to operate faster than the other rather than slip the roll on the metal.

The Uni-temper mill of comparatively recent development can also be used for tempering heavier steel strip, or for nonferrous materials. During the past 3 years, it has been in successful use, primarily for temper rolling strip in tin plate gages.

Describes Electrical Equipment

Mechanical details of the Uni-temper mill, as well as some measure of the good results obtained, having been described in a paper before the Association a year ago, a paper, "Electric Drives on the Uni-Temper Mill—Their Selection and Operation", presented before the Chicago regional meeting by J. C. McCurley, electrical engineer, Republic Steel Corp., Warren, O., and J. D. Campbell, steel mill division, industrial engineering divisions, General Electric Co., Schenectady, N. Y., had for its purpose to point out how important a role the electrical equipment plays in success of the mill, and to describe in general the motor drives and their means of control.

The authors pointed out that proper co-ordination of electric equipment with the mechanical equipment is of utmost importance to completely satisfactory tempering performance. It is believed that in such a mill the need for careful application of electric equipment is greater than on conventional temper mills.

Previous temper rolling mills utilized working rolls to cold work the tin plate, and strip tension values were only a secondary consideration. The Uni-temper mill, Messrs. McCurley and Campbell explained, is almost a converse of the conventional temper mill, in that the former continuously stretches the material, and any rolling action becomes the secondary consideration. The new type mill has some of the characteristics of the common stretcher leveler, arranged in such a way that the material can be stretched continuously at a high speed, with the material still in strip form.

Conclusions of the authors are that the Uni-temper mill has proved a practical machine; it is beyond the experimental stage, and is used regularly on production schedules. From the electrical man's viewpoint, the equipment has the following outstanding features: (1) Dependable and consistent mill motor performance at highspeeds with mini-

mum maintenance per drive; (2) adjustable elongation control with simple, trouble-free, electronic-amplidyne speed regulator, having an accuracy of 0.25 per cent or better; (3) adjustable tension control on all puller and reel motors, using amplidyne generators as regulators; (4) adjustable voltage control of the main generator, using an amplidyne voltage regulator; and (5) reduced electric power consumption per ton of tempered strip.

"Rail Mills and Rail Mill Roll Design", a paper presented by Ross E. Beynon, superintendent, roll shop division, South Works, Carnegie-Illinois Steel Corp., South Chicago, Ill., was a most comprehensive collection of historical data on the subject, and for that reason defies brief abstracting. Production and use of wrought rails dates back to the early years of the nineteenth century.

The author points out that of 11 mills on the North American Continent rolling large tee rails eight are classed strictly as rail mills, although some of these are now rolling billets and rounds as well as rails. The other mills roll structural and other shapes as part of their product. Some mills roll direct from the ingot while others reheat the bloom.

These mills are far from being standard in layout, according to Mr. Beynon. Some have a large number of stands, others only a few; some are 2-high throughout, while others are 3-high. Most rail mills in the country today are equipped with controlled cooling boxes.

Literature Reveals Surprises

Summing up his contribution, the author asserted that search of the literature on rolling technique was a source of many surprises. Many of the mills and rolling processes, believed to be of modern design, had been designed and in many cases actually tried years before.

Fundamental relationships of gas quantity per unit of blast blown, and gas quantity per unit of coke charged, were explained and tabulated, and the grades of blast furnace gas as resulting from coke rates per ton of pig, were presented graphically in a paper, "Some Characteristics of Blast Furnace Gas", compiled by Owen R. Rice, metallurgical engineer, Freyn Engineering Co., Chicago.

Typical blast furnace gas is presented in three categories: Lean—87 Btu; medium—92 Btu; and rich—98 Btu. These classifications are derived from a study of average annual coke rates at pig iron, coke-fired blast furnaces throughout the country over the last 31 years, but more particularly from a sampling of coke rates at many individual furnaces in current years. Actual blast furnace gas is that which the user receives, rather than that which the analyzer reports. Corrections may be required.

In this connection, Mr. Rice commented that blast furnace gas has deteriorated over the years. In 1913, it probably had prevailing a gross thermal value of about 99 Btu per cu ft. In the ensuing decade it lost about 2 heat units. Ten years later, in 1933, the average gas in this country probably hit an all-time low of about 89 Btu per cu ft. This account is based on the premise that the $CO:CO_2$ ratio varies with the coke rate, and that consequently the CO content and hence the Btu value do likewise.

Combustion criteria of blast furnace gas of the three typical grades, under a variety of actual conditions, are tabulated and depicted graphically in the paper. A hypothetical heat balance on a hot blast stove is presented, showing that it is not difficult to slip into erroneous conclusions.

One of the greatest problems of the lubrication engineer and operator is how to avoid the consequences of oil contamination in respect to continuous operation of machinery under his charge, said Joseph D. Lykins, lubrication engineer, Wheeling Steel Corp., Yorkville, O., in introducing a paper on "Reclamation of Oils." The machine designer provides the proper bearing and gear designs, as well as means for supplying lubricants between bearing surfaces, but he has little if any control over maintenance of the lubricating oils which if not properly maintained will not render expected protective service, the speaker contended.

The various causes of oil breakdown, including the agencies affecting lubricating oils in service, their products, results of oil contamination and the different methods of preventing and removing contamination from the oils, were discussed by Mr. Lykens. Several methods are available for removing this contamination, these including screen-type strainers or filters, pressure or vacuum filters, magnetic filters, gravity purifiers, distillation, centrifuge, and contact earth or adsorbent materials. These various methods were discussed as to what impurities each will and will not remove.

At one of Wheeling Steel's plants, a palm oil reclamation unit has been in service since 1942. It reclaims oil used in the process of cold rolling steel on two 5-stand, 4-high tandem mills, and results are so satisfactory that the plant is now using a 50-50 mixture of new and reclaimed palm oil in rolling on these mills.

Cleveland Regional Meeting
Hotel Hollenden, Oct. 3

Effectiveness of combustion engineers in helping to consume all utilities to the best advantage was emphasized by P. L. Walter, superintendent mechanical department, Republic Steel Corp., Canton, O., at the Cleveland conference. They conduct combustion analyses, boiler tests, run checks for leaks, calibrate and maintain all metering equipment, engineer modern and more efficient installations, make suggestions for improved operation and many others. Even plant protection personnel in their tours of the plant are reporting unnecessary lighting, unused running water and leaks.

He stressed the importance of conserving electricity whether or not a mill generates its electric energy requirements by purchasing coal from an outside source or if it receives its electric energy from central station system, which then buys coal for generation of power sold.

In all steel plants, he pointed out, there are many applications where synchronous motors, which can be overexcited to generate a leading reactive current, can be used to advantage in improving the average plant power factor. In our plant, this is done wherever a drive with the characteristics of synchronous equipment is practical. All air compressors, motor-generator sets, exciters, frequency changers and similar equipment are driven by synchronous motors.

Modernization of existing equipment invariably pays large dividends in the form of power savings and all present installations should be studied with the idea of investigating possible savings which can be affected by slight changes or additions toward a more efficient operating unit. In our plant, Mr. Walter stated, the conversion of bar mill roll neck bearings from the original bearings which were difficult to keep lubricated to water lubricated fabric bearings has reduced the mill friction load by approximately 45 per cent. All new motor equipment, wherever advisable is being purchased with antifriction bearings, and all older sleeve type bearing motors are being changed over to antifriction bearing equipped motors by installing new adapter type end bells. Changeover bearing brackets for most all centrifugal pumps are now available. The power savings resulting from conversion to antifriction bearings on pumps will pay for the brackets in approximately 1 year.

However, so far as the conservation

(*Please turn to Page* 156)

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Lubrication in the Drawing of Metals

Concluding installment of 2-part article discusses specific methods of testing drawing lubricants. Mr. Spring presented further data on drawing lubrication in STEEL March 19, 26; April 2, 9; August 13, 20; and October 8

BY SAMUEL SPRING
Chemist
Frankford Arsenal
Philadelphia

ONE of the methods most widely used in testing drawing lubricants involves performance of an operation similar to that used in production drawing, but at lower speeds, and determination of the forces required for the operation. Professor H. W. Swift of Sheffield University utilized a method of this sort for mechanical and lubrication studies[10]. Dr. R. C. Williams of the Ironsides Co. utilized a small wire drawing machine for the same purpose[11]. The author has also utilized this method in performing one of the draws in cartridge case manufacture[12]. Closely related to this technique of experimentation is the use by P. S. Parkinson of the E. G. Budd Mfg. Co. of a metal ductility tester, the Olsen cup test, in evaluating lubricants[12].

Another general method, which was fairly widely adopted, involves the use of extreme pressure lubricant testing machines with suitable modifications. The Falex EP lubricant testing machine appears to have been the most popular in this connection. In addition, the technique of utilizing production presses to perform drawing operations in considerable volume, under closely controlled conditions, is more tedious and expensive but should be used to check final conclusions derived from the other more indirect tests, wherever possible.

Production press testing under poor controlled conditions, however, has been more widely utilized. These methods will now be discussed in greater detail.

A—Swift Method. In this method punch and die assembly is used for the performance of a cylindrical cup drawing operation, the unit being made sufficiently compact so that it can be introduced into various types of presses (Fig. 9). The punch load is measured and recorded. This is done by making the body of the assembly in the form of an annular cylinder mating with a piston integral with the rigid cast iron base. The annular space is filled with light oil and communicates with a modified engine indicator.

For his lubrication studies [40], Professor Swift utilizes this assembly in a multiple lever machine of 100,000 lb capacity which delivers a drawing speed of 1.5 ipm. For these tests, a cylindrical cup is pressed from a flat circular blank 4 in. in diameter and 0.036-in. thick. This operation involves shaping rather

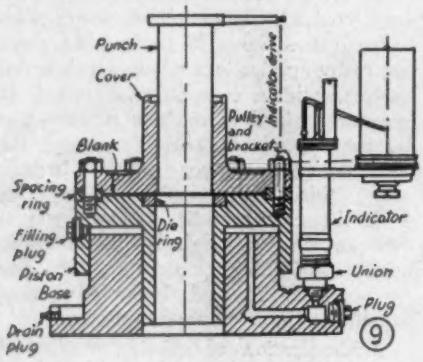

Fig. 9—Punch and die testing method as used by Swift[40]

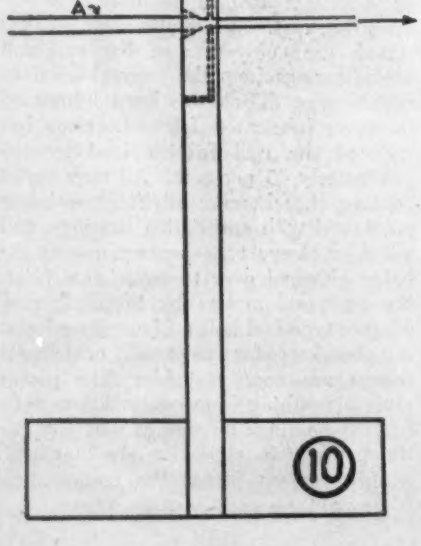

Fig. 10—Williams[41] testing method employs a wire pulled through a die in a dynamometer plate

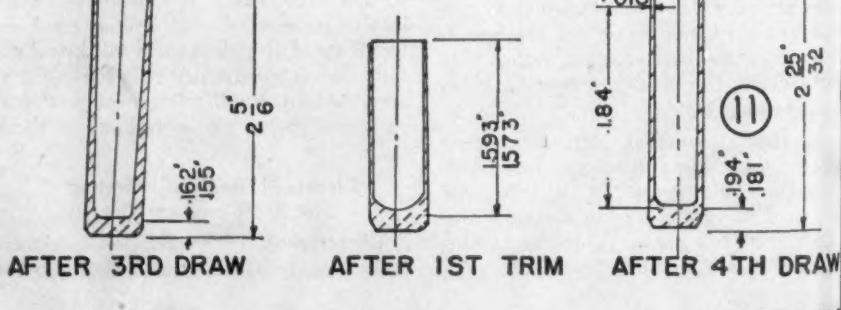

Fig. 11—Frankford Arsenal draws test pieces in a 20,000-lb tensile testing machine, Fig. 12

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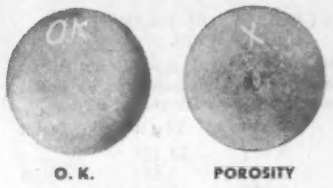

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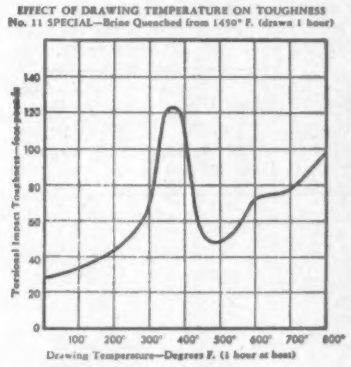

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The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.

than ironing to a major extent and consequently may be considered to be of light to medium severity.

With the above procedure, Swift found that certain solid constituents in lubricants, particularly flake graphite and powdered soap in an oil vehicle, caused the greatest reduction in maximum draw forces. This effect has been confirmed in its more general aspects but many specific differences have been observed. The combination of metal type and lubricant was found to yield specific effects which is in accord with other data and boundary lubrication theory.

B—Williams Method. In this method[41], wire is pulled at constant speed through a die fixed in a dynamometer plate (Fig. 10). This plate (D) is fixed in position and deflected during the drawing process. The magnitude of the deflection is measured in thousandths of an inch by a dial gage which is suitably mounted to make contact with the top of the plate. Plates of different deflectability are selected to avoid excessive displacement. Various plates are calibrated so that the die pull can be represented in kilograms. In order to maintain the wire being drawn (A) in a taut condition it is necessary to provide a back pull on the wire. The magnitude and uniformity of this back pull influences the pull on the die to a marked extent. This backpull is provided in the following manner:

The wire to be drawn is taken from a spool mounted in a shaft. A pulley which serves as a brake drum is mounted on the same shaft and a belt held taut against the pulley by two spring balance provides braking friction. The difference between the readings of the balance when the machine is operating gives the back pull on the wire. The validity of this test so far as friction reduction is concerned is attested to by the agreement of a good deal of the data[41,43,44] obtained by this method with theoretical considerations. Much of the data also agrees with those obtained by the Frankford Arsenal method[42].

C—Frankford Arsenal Method. This method has also been used by Professor G. Sachs of the Case School of Applied Science. In this method [42], draw pieces of characteristic shape (Fig. 11) are drawn in a punch and die sub-assembly in a 20,000 lb tensile testing machine used in compression (Fig. 12). The forces required for the draw are reproduced autographically and have characteristic shapes (Fig. 13). Because of variations in head and wall thickness due to allowable tolerances, it is necessary to obtain the average for at least 10 pieces for adequate comparisons. Since the autographic curves are constant in form, the

TABLE I

REPRODUCIBILITY OF DRAW PRESS TEST DATA

(Number of cal. .30 steel case pieces drawn prior to formation of visible scratches on work, using same tools for each repeat test).

Lubricant	Test 1	Test 2	Test 3
A	9,141	11,121	.....
B	4,785	7,854	8,415
C	7,029	7,590	.....
D	10,294	13,850	.....
E	26,048	19,584	.....
F	400	385	.....
G	541	626	.....
H	302	320	.....
I	7,000	34,000	7,000

Lubricants A to D, inclusive, were tested as one group whereas the others were tested with varying tools and draw pieces. The evaluation of lubricants in this series was the same as that obtained from Falex Test data.

TABLE II

(Analogy of data obtained with the same lubricants on steel and carbide dies. Data obtained in first draw of cal. .30 steel case).

Lubricant	Tool Life—Steel Dies	Tool Life—Carbide Dies
A	1 to 50	16,000
B	2100	134,000
C	1800 to 2600	150,000

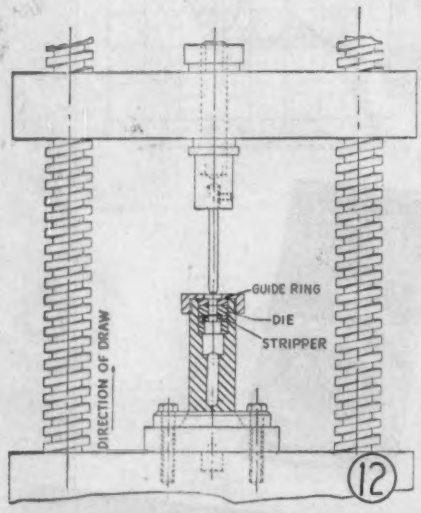
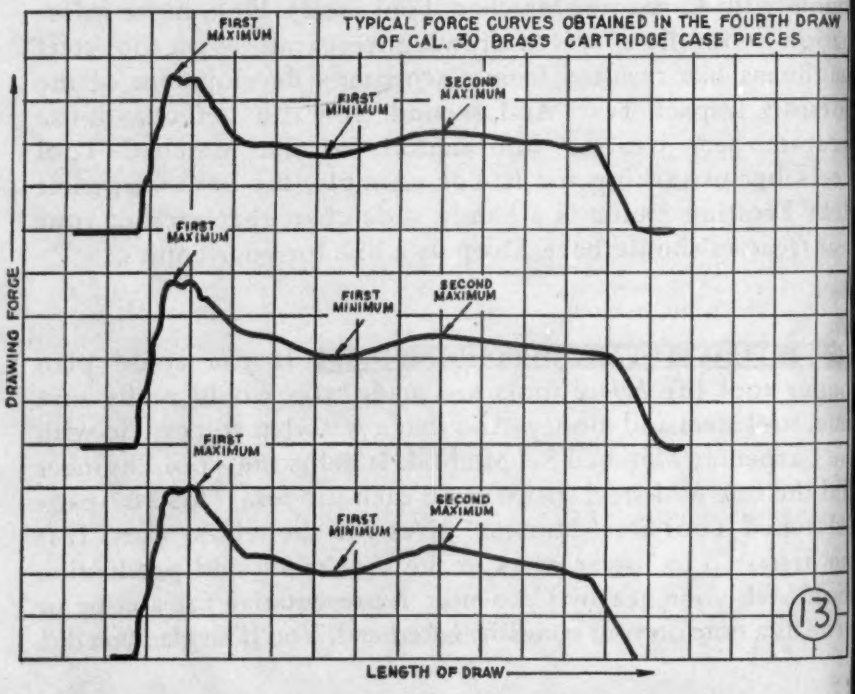
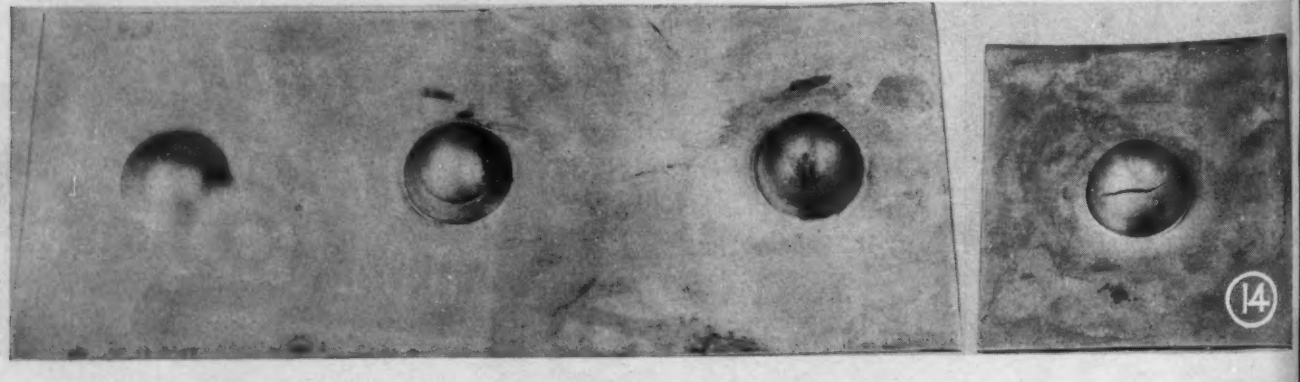


Fig. 12—Setup in Riehle tensile tester used by Frankford Arsenal

Fig. 13—Forces required are reproduced autographically

Fig. 14—Cupping method is employed by Parkinson





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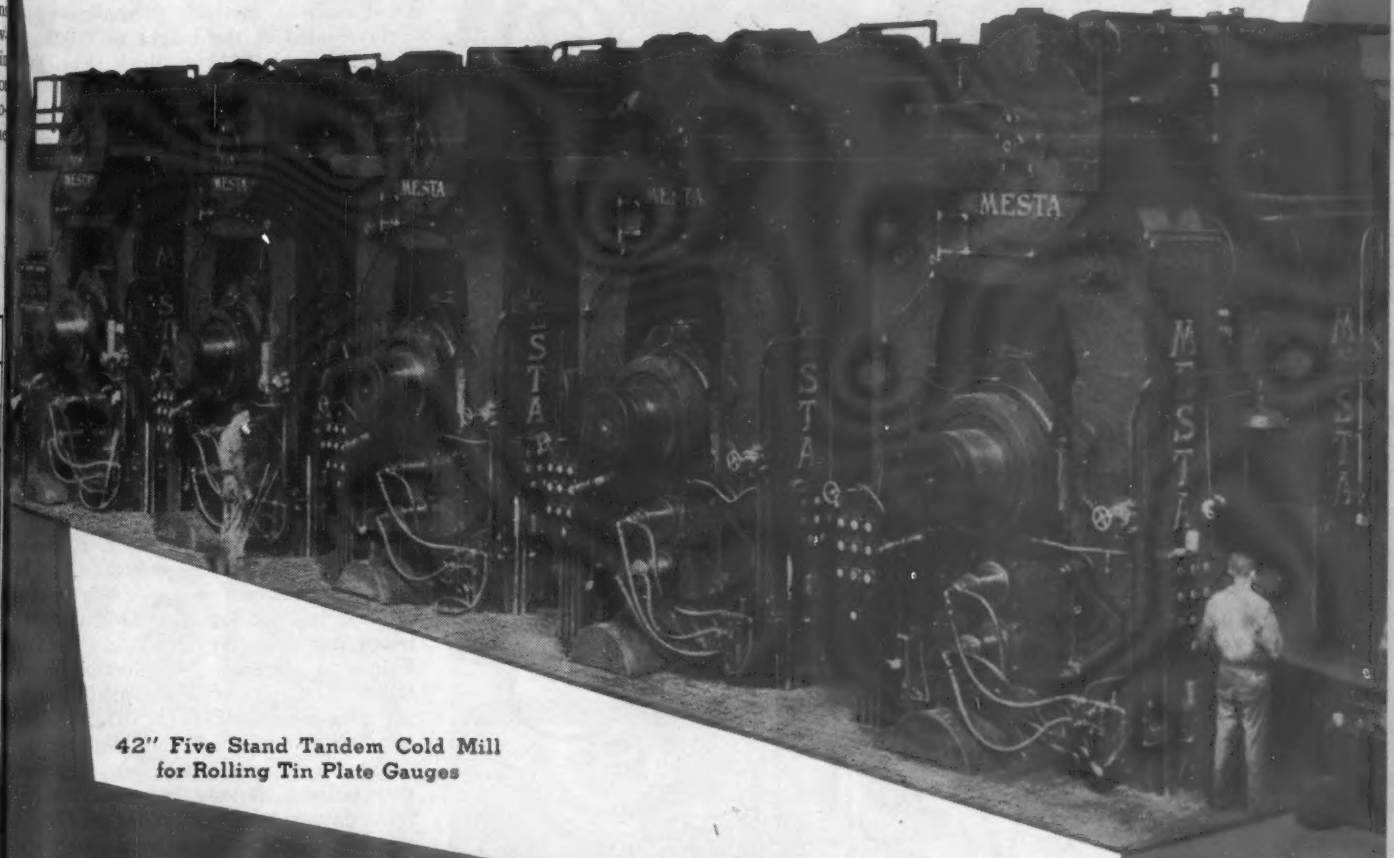

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expedient is adopted of summing the first maximum, first minimum and second maximum forces (Fig. 13) and listing these as the Lubrication Index. Differences greater than 5 per cent are significant. In this test there is far more ironing than in Swift's test. The data obtained by the author with this method on brass pieces have agreed quite closely with those obtained by Williams, but the effect of solid constituents in a fluid vehicle, noted by Swift, has not been observed. (Swift did not obtain this effect with all solid constituents). Insofar as lubricants for drawing steel are concerned, the greatest value of this method has been in the evaluation of surface pre-treatments such as rusting, sulfiding, bonderizing, coppering, etc. and evaluation of dried deposits as drawing lubricants.

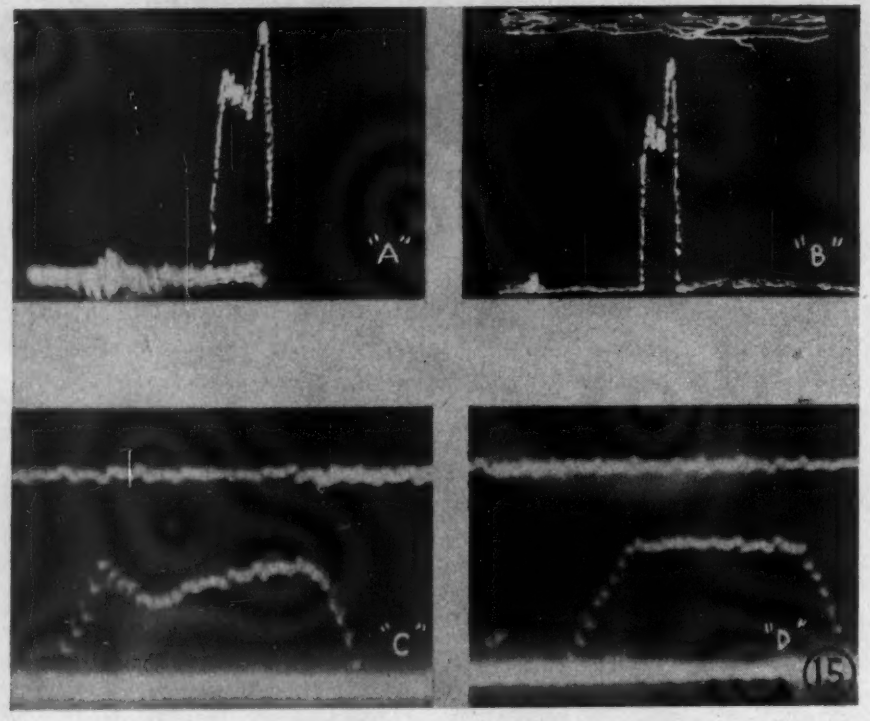
In general, the data obtained with this method for steel for various applied lubricants did not agree very closely with those obtained with shop tests. The exception to this was in the case of some surface coating studies. However, the data obtained with brass was confirmed by shop tests in most cases. Probable reasons for this situation are given later.

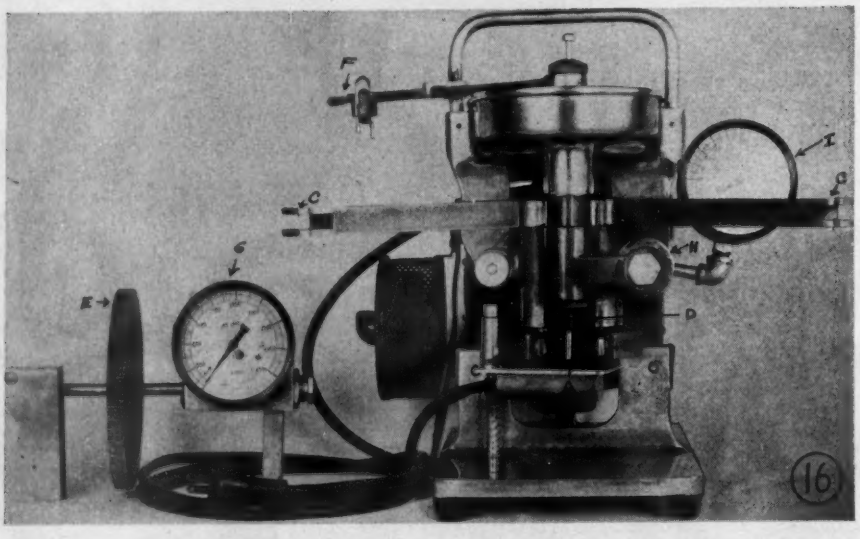
It is fairly obvious that this technique of obtaining frictional force data in drawing operations is quite flexible and draw pieces of various characteristics can be similarly drawn.

D—Parkinson Method. The Olsen ductility test is utilized in this method. A steel ball 0.875-in. in diameter forces a strip of sheet metal through a steel ring 1 in. in diameter. This action is normally continued until either a pressure drop occurs or the metal develops a visible necking (incipient fracture). In the Parkinson method, a shallow cup is pre-formed to the height of 0.028-in. in sheet metal 0.042-in. thick (Fig. 14). The lubricant is then applied between the inside of the cup and the ball and the surfaces adjacent to the drawing ring, and cupping is then continued until a pressure drop or incipient fracture occurs. The criteria of evaluation are the height of the cup when fracture occurs and the distance from the base of the cup to the point of fracture. Some of the data obtained with this method, in general, confirm those obtained by the Williams and Frankford Arsenal methods, the latter in the case of the drawing of brass[12]. Parkinson has indicated that his data showed the value of solid fillers of appropriate characteristics in sheet steel drawing, which agrees with data obtained by other methods.

E—Some efforts have been made to measure drawing forces at high speed by utilizing resistance strain gages and a cathode ray oscillograph. One such attempt was made by Dr. T. A. Read of Frankford Arsenal. A photograph of the force pattern obtained by this technique is given in Fig. 15. This method is more complicated and requires expensive equipment but has important potentialities. It may be noted that the force pattern is rather similar to Fig. 13, which was made at low speed.

F—Crown Cork and Seal Co. Modification of Faville and Crowley Method. While all the extreme pressure lubricant testing machines previously described have been used in testing cutting lubricants, it is the Falex machine (Fig. 16) which apparently was most widely used in testing lubricants. On this basis, it would be well to describe





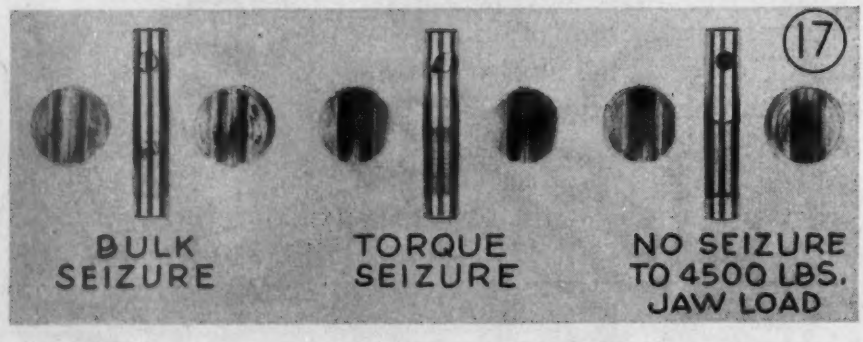


Fig. 15—Measuring drawing forces at high speed by utilizing resistance strain gages and a cathode ray oscillograph offers possibilities

Fig. 16—The Falex machine is widely used in testing EP lubricants

Fig. 17—Condition of parts tested in the Falex machine

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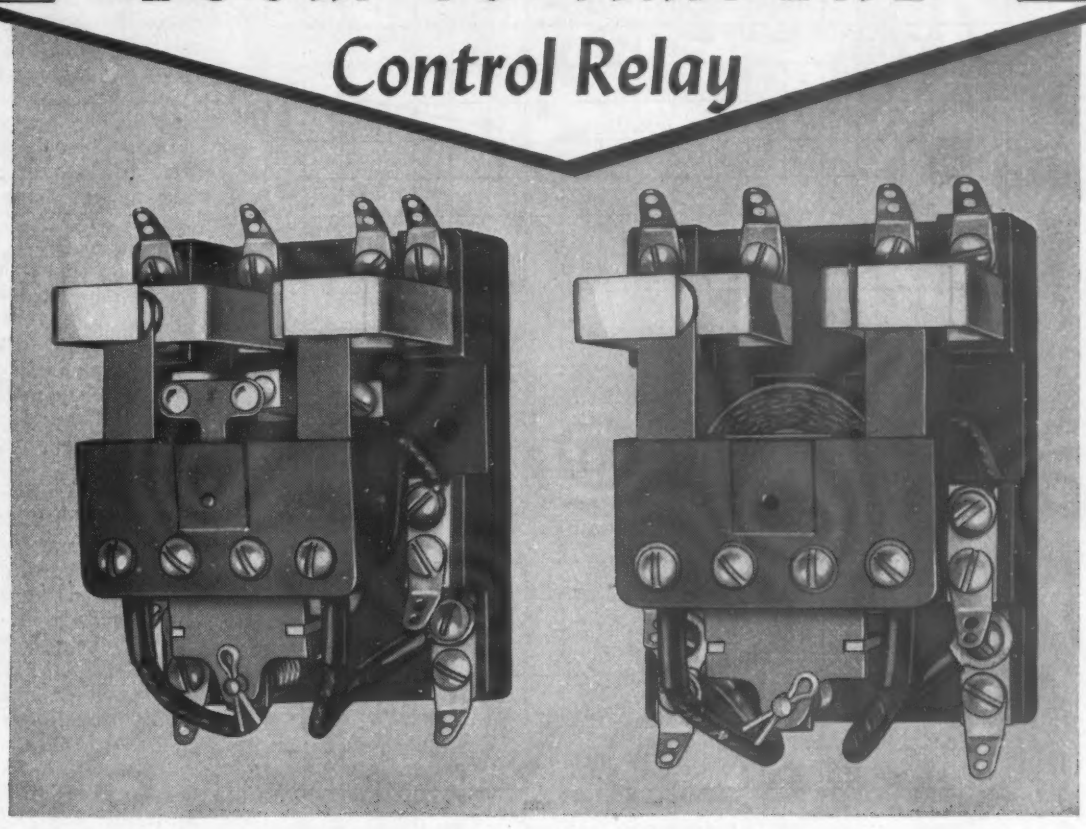

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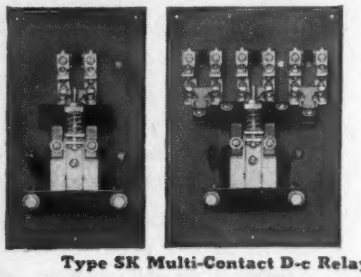

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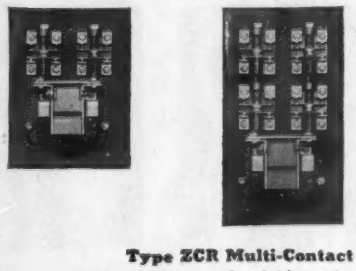

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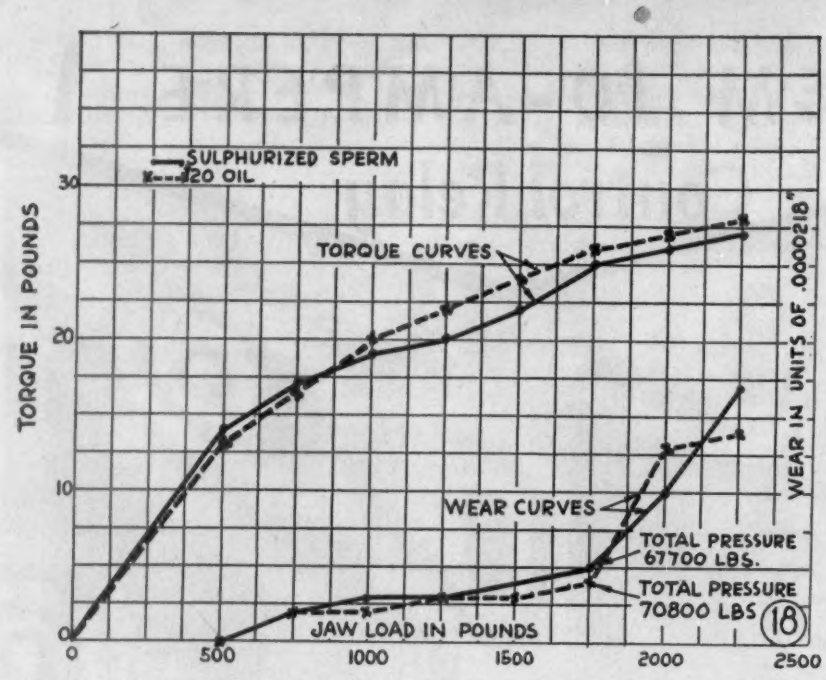
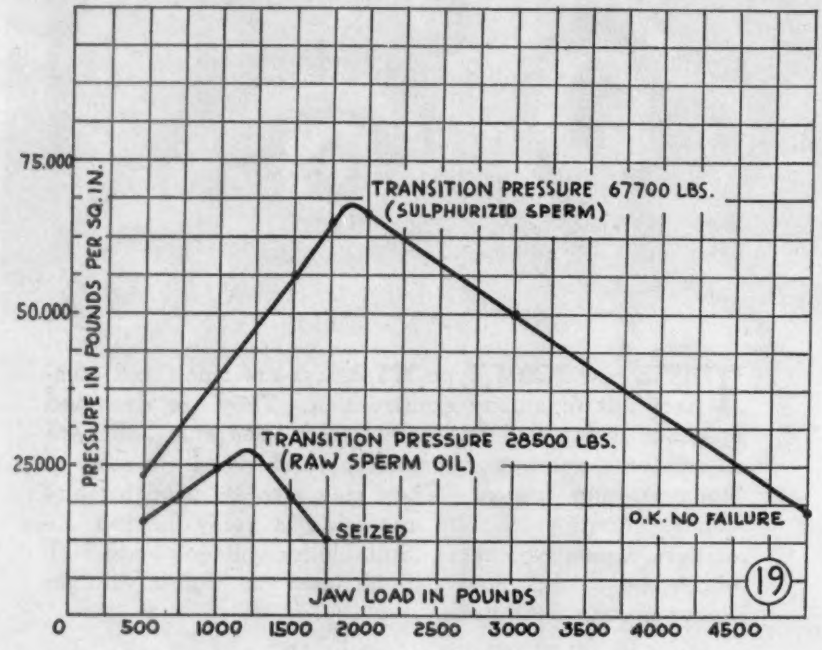
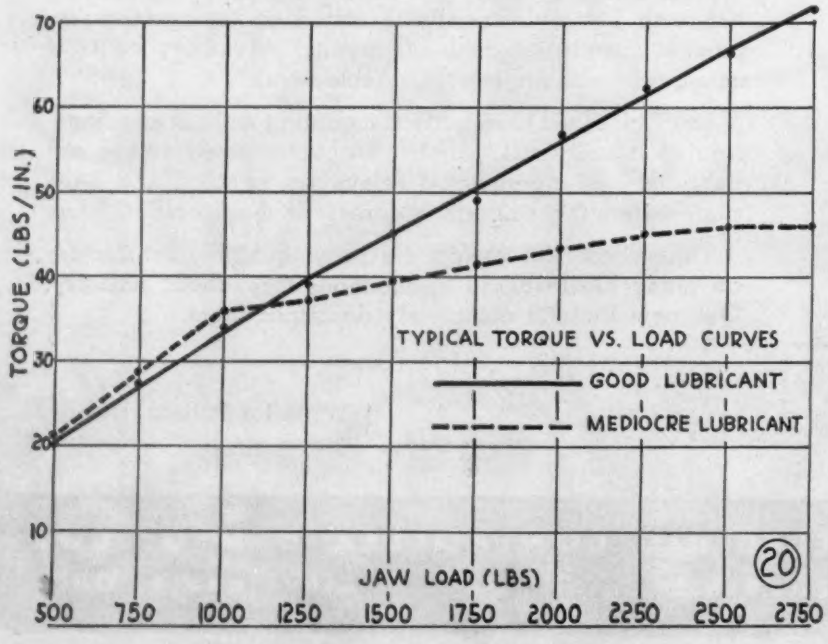






the Falex machine in more detail here

In this machine a rotating steel pi (A) initially makes line contact with tw V-shaped bushings (B) at four places These bushings are pressed against th rotating steel pin by two "nutcracker" jaws (C) through which the load is ap plied. The steel pin is keyed to the driv ing shaft by a small brass pin (D) which breaks when the resistance towards mo tion becomes excessive, thus protecting the motor. Some types of failure are shown in Fig 17. The bushings and pin (journal) are immersed in a lubri cant cup (not shown) to which 55 cc o lubricant are added.

The load is applied by turning a ratchet wheel (E) which compresses a strong spring. When desired, this ratchet wheel is automatically rotated at a con stant rate by a pawl (F) working from an eccentric on the driving shaft. The load applied to the bushings is read directly from the jaw load gage (G) The assembly holding the test blocks is thrown against a sylphon bellows (H) by the frictional drag on the blocks and registers on the dial gage (I) as torque in pound-inches. This frictional mea suring device is not very refined. The standard test parts supplied by the manufacturer include ¼-in. pins of SAE 3135 steel (hardness-rockwell B 84-86) and V-bushings with approximately 96° angles made of SAE- X-1335 steel (hard ness rockwell C-20). Although the test parts have been finish ground, it has been found desirable to polish them before use.

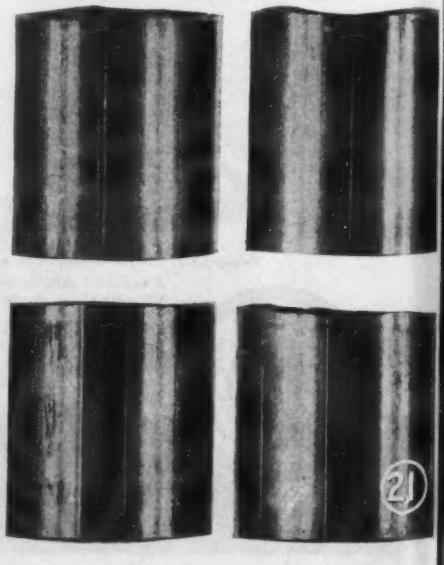
In this application, the method which was most successfully applied was

Fig. 18—Plotted results with Falex machine

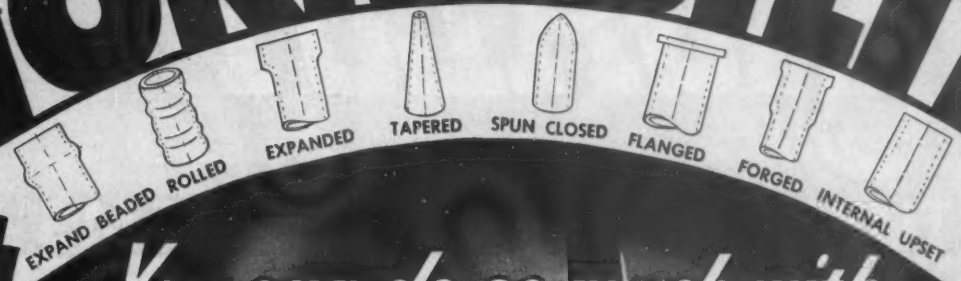
Fig. 19—These curves indicate the transition point or load

Fig. 20—Typical torque vs load curves

Fig. 21—Typical scratches considered as end points in tool life determinations with various lubricants. Magnification 4x



WORKABILITY



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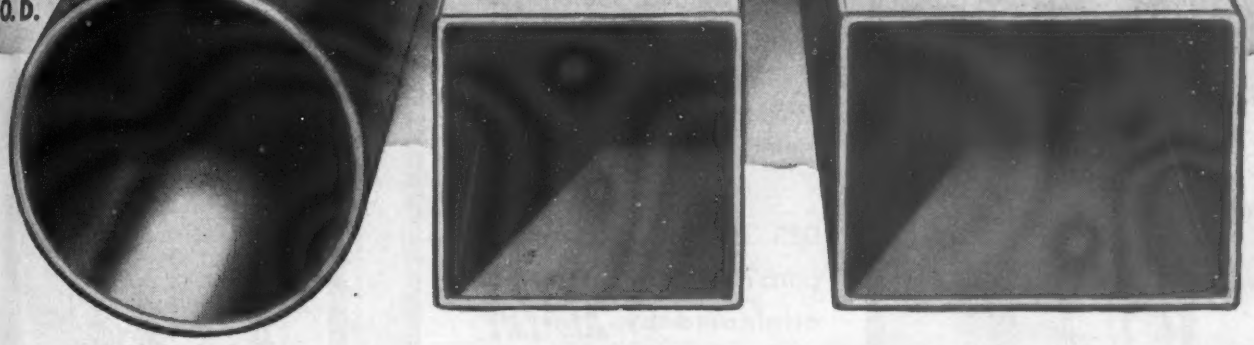

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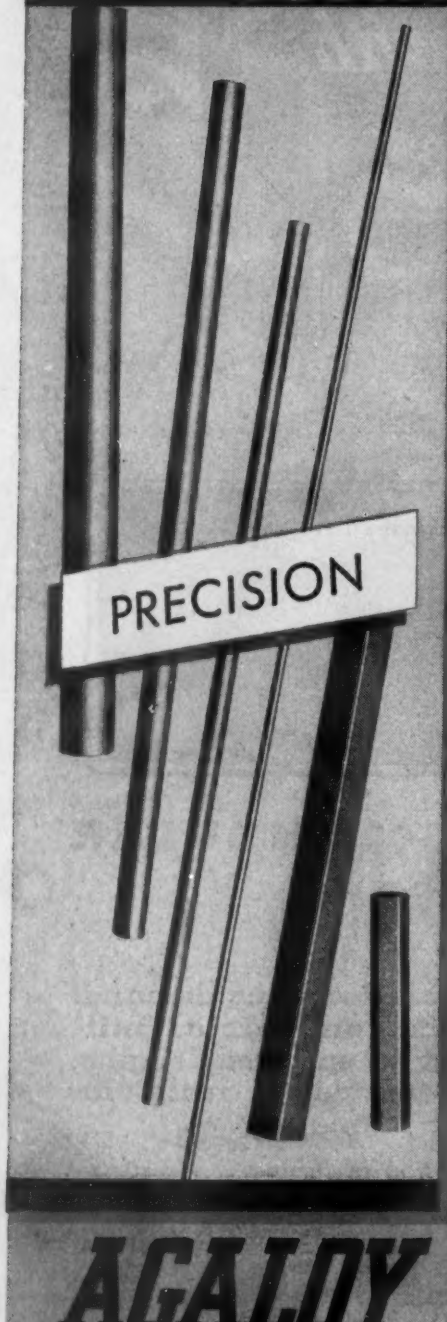
TUBING · TUBULAR FORMS



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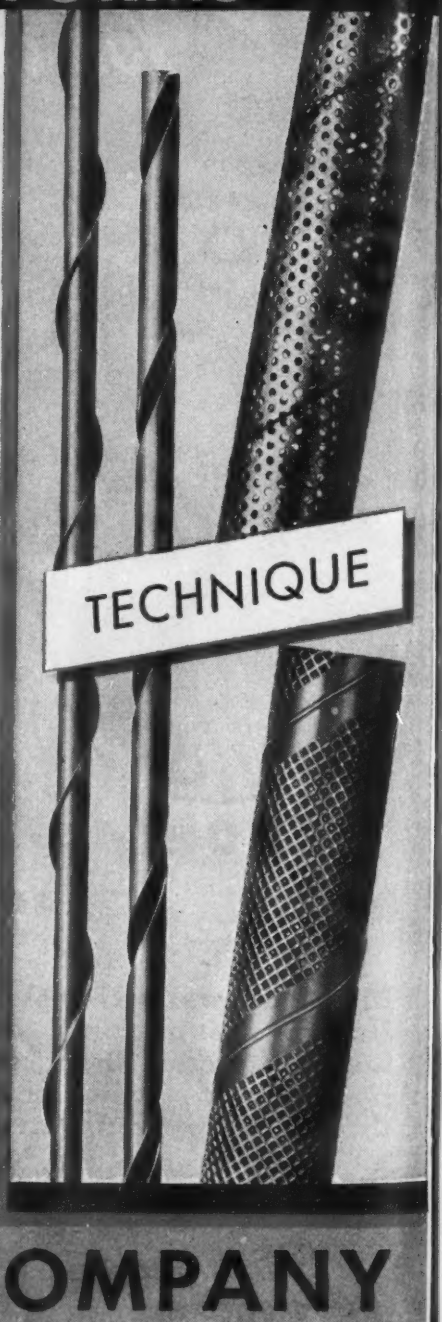

AGALOY TUBING COMPANY

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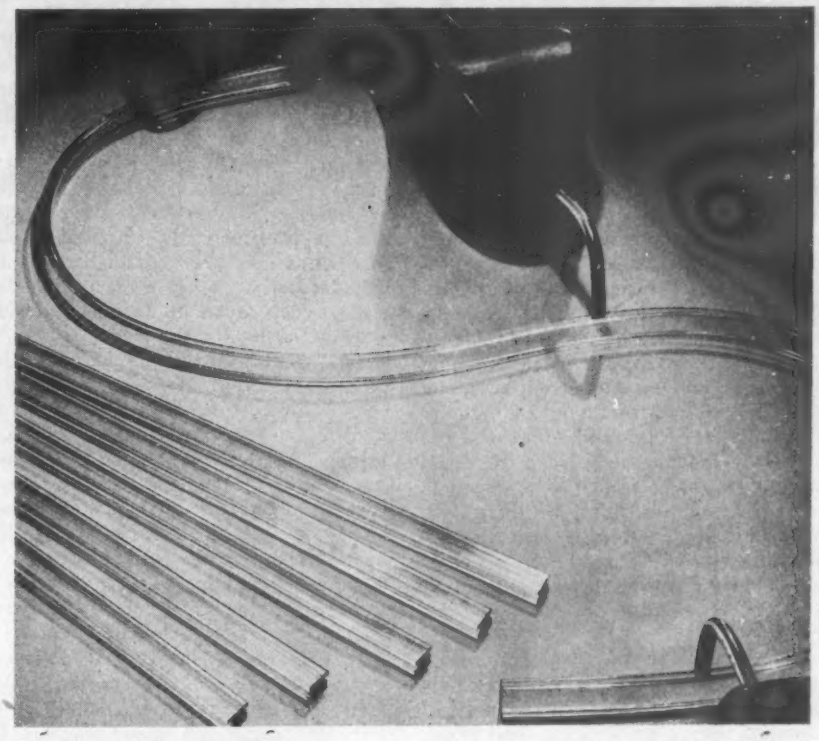
adapted from the Faville and Crowley[38] procedure at the laboratory of Victor A. Ryan of the Crown Cork & Seal Co.[45]. In this modification, it was found impossible to obtain reproducible results with the V-blocks normally supplied with the Falex machine. To overcome this, blocks are prepared with exactly 90° angles and hand-honed before the tests. In addition, the load gage is re-calibrated so that applied load in pounds is that applied on the faces of the 90° angle V-blocks. Two testing techniques are used; one for research investigations, which is referred to as the 3-min step test, and the other method for production control referred to as the 1-min step test.

In the 3-min step test the procedure is as follows: A set of test specimens (2 blocks and 1 pin) is inserted in the machine, the lubricant placed in the cup, and the machine run for 3 min at a 500 lb jaw load. As the end of this time the specimens are removed, the blocks cleaned, and the width of the scar on the face is measured under a microscope. The procedure is repeated at increasing loads of 250 lb increments using a new test set up at each load. At the end of the test, which is indicated either by the seizure of the specimens or by its taking the full jaw load of 4500 lb without seizure, the actual pressure applied to the faces of the blocks is computed from the scar width and length and the applied jaw load. The pressure (psi) is then plotted against the jaw load and curves similar to those in Fig. 18 invariably result. The maximum point of the curve is the transition pressure and it may be necessary at times to make individual tests slightly below and slightly above this load in order to determine this point accurately.

One Minute Step Test

The 1-min. step test used as a routine and evaluation test is a little quicker and is usually sufficient for practical control purposes. This test is made on one set of test specimens, which is mounted in the machine and run-in for 3 min at a jaw load of 500 lb. At the end of 3 min, the load is increased to 750 lb and held there for 1 min by lifting the ratched arm off the wheel. At the end of the minute the arm is replaced and the load continued to 100 lb, where it is similarly held for 1 min. At the end of each minute the load is increased by 250 lb until the specimen fails or the machine capacity is reached without failure.

As this test is being made, it is noted that, at the lower loads, the indicator on the pressure gage begins to move immediately on placing the ratchet arm on the wheel. As the load increases a lag becomes apparent and there are several "clicks" of the ratchet before the indicator moves. These clicks are due to the pawl engaging the loading wheel. When the transition pressure is reached, after the 1 min run, the indicator hand on the jaw load gage drops below the reading at beginning of the run at that increment and when the ratchet arm is placed back on the wheel the number of "clicks" before the hand reaches the pressure at which it started is from three to eight times as many as the previous increment.



DRAFTSMAN'S SPLINES: Accurate curves are assured by these splines of extruded Tenite which have a high degree of dimensional stability. An even edge is maintained although they are flexible and resilient and take any desired curvature. Metal dogs hold them in place by being hooked to the H-shaped profile of the strip

This is the transition load or transition point as it may be called. In making the tests, the number of clicks are counted at each applied jaw load to the transition point and after transition to either failure or full load, as the case may be. These "clicks" represent the wear on the test parts. In presenting the results, there are plotted units of wear against the applied load and curves in the form shown in Fig. 19, usually result. These curves clearly indicate the transition point or transition load. If it is required to carry this test a little further and convert the transition load to transition pressure, a new set of test specimens is mounted in the machine, run in for 3 min at 500 lb load and then taken by the ratchet arm directly up to the transition load and held there for 3 min. At the end of 3 min the blocks are removed and the pressure in pounds per square inch computed from the width of the scar and jaw load.

The Frankford Arsenal Procedure with the Falex Machine. The method employed at Frankford Arsenal is rather similar to the 1 min step test of the Crown Cork & Seal Co. referred to above. In this work the V-blocks obtained from the manufacturers are honed on soft and hard Arkansas stones and the run-in at 500 lb jaw load for 3 min. They are then withdrawn and examined for uniformity of the wear scar that is formed during running-in. If satisfactory, they are reinserted into the machine. With this selective procedure it apparently is unnecessary to use 90° angle blocks for adequate results. The lubricant under test is introduced into the lubricant cup and the test run for a minute at each 250 lb increment. Break down of the lubricant is established by observing the jaw load at which 10 or more teeth on the loading wheel ("click") are required to restore the originally applied jaw load after a one minute run. The test is stopped at 2750 lb and the width of the wear scars compared. In addition, data are taken to enable plotting torque (frictional reading) against jaw load by recording torque readings at the beginning of each 250 lb increment. These data are of value only in a very limited sense and drop off in the torque vs. load curve (Fig. 20) is considered to be due to decrease in unit pressures as a result of increase in area of the wear scar.

It may be mentioned that the Crown Cork & Seal Co. modification was used most extensively on oil base lubricants whereas the work at Frankford Arsenal was mainly on water base lubricants. As such, it was very helpful as a screening test to eliminate the least promising drawing lubricants and consequently kept the number of controlled draw press

tests to a minimum. In addition, it was very useful in the development of new lubricants which were then checked by means of the draw press test.

It is considered that the use of an extreme pressure lubricant testing machine for evaluating drawing lubricants is a promising technique and that crude comparisons among lubricants can probably be made with many other modifications of the procedure. However, the above modifications of the Falex test have been very successful in this connection. Before leaving this subject, brief reference may be made to the procedure used by Kipp[40] in determining the lack of important differences among many natural fats so far as rolling mill lubricants are concerned. This test on the Falex machine employed frictional (torque) measurements to great extent in comparison to the other procedures. In the main, torque readings at 250 lb intervals were plotted against jaw load for the fats dissolved in mineral oil.

Discussion of Laboratory Tests

Considering the two types of laboratory methods, i.e. the low speed drawing or cupping and the extreme pressure lubricant testing machines several points of difference show up. Low speed drawing methods are performed at such low speeds that the high heat concentrations normally present in production operations are absent. This imposes certain restrictions to the method, particularly with reference to those lubricants containing reactive constituents. The EP lubricant machines are more sensitive to the presence of reactive constituents such as sulphur, chlorine or phosphorus than the low speed draw test mainly because the heat generated during the test increases reaction with the metal surfaces. In this respect these testing machines might be too sensitive toward reactive constituent in comparison with production operations, particularly in the cases of presses operating at moderately low speeds. These testing machines also appear to slightly be less sensitive towards solid constituents (fillers) than production tests. Moreover, these tests cannot be adequately used to evaluate solid coatings such as dried soap, wax, sulfide, rust etc. Drawing or forming tests must be applied to the latter even though interpretation is more difficult, and some types of data are invalid. The main reason for this is that lowering of frictional forces is the normal criterion whereas some very effective lubricants actually increase frictional forces.

On the other hand, the low-speed, force-measuring tests seem more adequate for brass than for steel so far as fluid lubricants are concerned. This is probably due to the greater importance of reactive constituents in lubricants and higher temperature for reaction for steel drawing than for brass drawing. The effect of filler is claimed by Swift and Parkinson to be an important quantity measurable by this type of test but the authors experience indicates lack of sensitivity in this connection.

Another disadvantage of low speed drawing tests is that a large part of the total force measured is required to deform the metal, thus tending to mask differences in friction. In spite of this, these methods still have a wide sphere of usefulness when properly interpreted.

G—Press Tests. Insofar as is possible, it is desirable to check final conclusions derived from the use of the devices previously discussed, by means of press tests under controlled conditions. This is by no means a simple procedure because of the multitude of mechanical factors which must be controlled or for which correction must be made. Discussion of many of these factors has been made by Jevons[47] and in data previously presented by the author[1]. In performing press tests, however, there are several factors that may be considered, as follows:

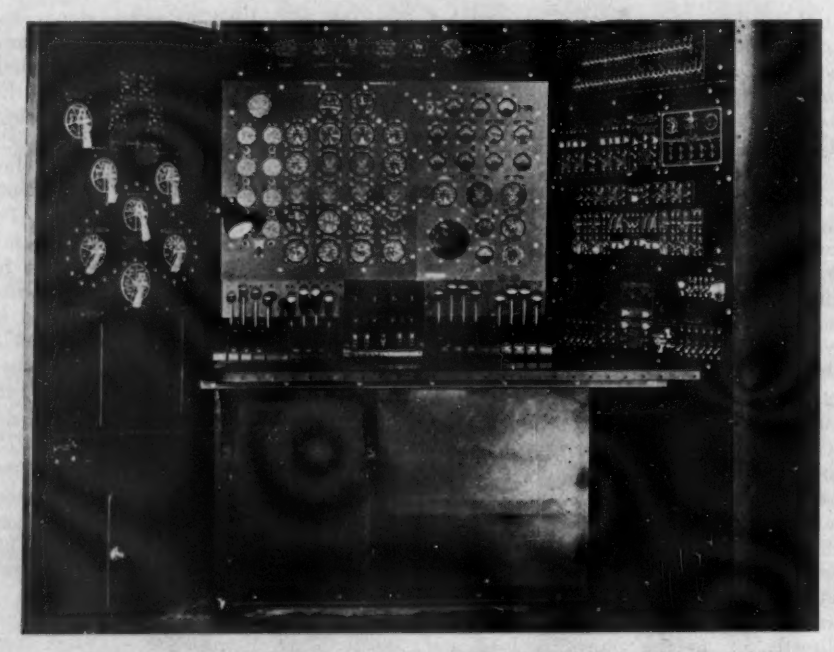
1—Establishment of a Criterion of Tool Life. This is frequently not easy. One system that has been used involves a count (by weight, truckload or actual number) of the pieces drawn prior to the first scratches that may be felt by rubbing the fingernail over the region. An example of one end point is given in Fig. 21. Counting the total number of pieces prior to complete scrapping of the tools is, unfortunately, more frequently used. This suffers from the disadvantage that the determining factors often become the skill of the tool polisher in removing build-up without taking too much metal from the tools and the rapidity with which the machine operator determines the occurence of build-up; this is so because far more metal must be removed in reconditioning the tools if they have been run after visible build-up has started.

In spite of the necessity for running to tool failure in order to establish the quality of the lubricant, many cases are existent in which one lubricant is compared with another without either being used sufficiently for any failure to occur. This is justifiable only under special conditions. Thus, if a satisfactory production figure for tool life is established at, for example, 16 hr production, a different lubricant having other advantages may be substituted if it consistently allows 16 hr production without tool change, even though no tests are run to tool failure.

Another factor that must be considered occasionally is that tests on carbide dies may be too lengthy or costly. It has been the author's experience that comparisons among lubricants made with steel dies are valid for carbide dies in most instances, while observable differences can be anticipated by consideration of the properties of the materials so far as lubrication is concerned[1]. Some data supporting this conclusion are given in Table II.

2—Determination of Number of Tests.

(*Please turn to Page* 180)



PREFABRICATED FLIGHT PANEL: Built entirely outside the ship to avoid difficulties in fitting together small subassemblies in a limited space aboard the 85-ton JRM Mars, which was built for the Navy, this flight panel was lifted into place by a crane alongside the ways on which hulls are built before the crown or top section of flight decks are installed. Inside the ship it is braced to structural ribs. Each of the 2200 wires in the panel—with a total distance of more than 2½ miles, or 25 per cent of the wiring in the ship—has a number corresponding to duplicate numbers on wires built into the ship, and installation is completed by matching ends. Total weight of panel, made by Glenn L. Martin Co., is about 650 lb

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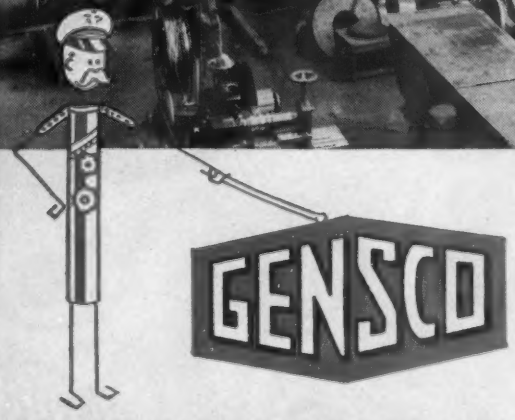

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Continuous electrogalvanizing practice, development and evaluation of solutions and preparation of base metal are covered in second article of series

CURRENT Zinc Electroplating PRACTICE

BY DR. ALLEN G. GRAY
E. I. du Pont de Nemours & Co. Inc.
Cleveland

SINCE the development of the electrolytic tinning lines for the continuous electrodeposition of tin on strip steel considerable thought and research has been given to the commercial possibilities of electroplating other metals in a similar manner. High purity zinc is now being deposited on continuous strip up to 38 in. in width at a speed of 160 fpm and in coating weights ranging from 0.1 to 0.2 oz of zinc per square foot of strip. It has been said that this process can be successfully carried out on any of the various types of lines which were designed for tin plating providing that adequate ranges are available for control, plating current supply, etc.[2]

In designing these lines it is apparent that the engineer, the machinery builder and the electrical manufacturer worked in close co-operation to provide the flexibility desired. Because this flexibility was provided initially, it is now found that these same lines that were designed for tin plating at a maximum speed of 1300 ft/min can be used for zinc plating without any appreciable change. Since coating thicknesses for zinc are much heavier than electrolytic tin plate the lines must operate at a greatly reduced speed; a speed of approximately 160 fpm being used to provide 0.1 to 0.2 oz/sq ft of zinc on strip 38 in. wide[21]. Here again is shown the versatility of the line design so that the automatic plating control is able to maintain full plating cur-

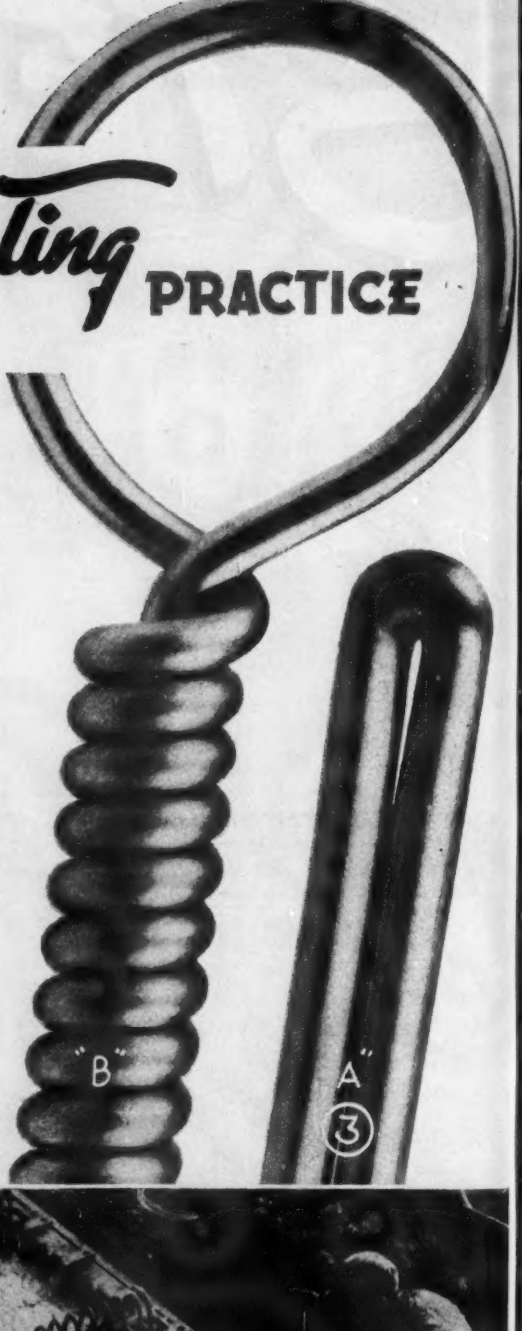

Fig. 3—Zinc plated coating remains intact even when wire is bent flat upon itself (A) and when wrapped around its own diameter (B)

Fig. 4—Cells used in high current density acid zinc plating of steel wire by Bethlehem Steel Co.'s Bethanizing process. The pure zinc coating is very ductile and tight adhering

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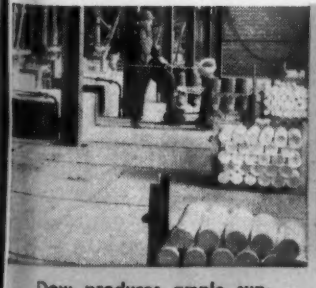

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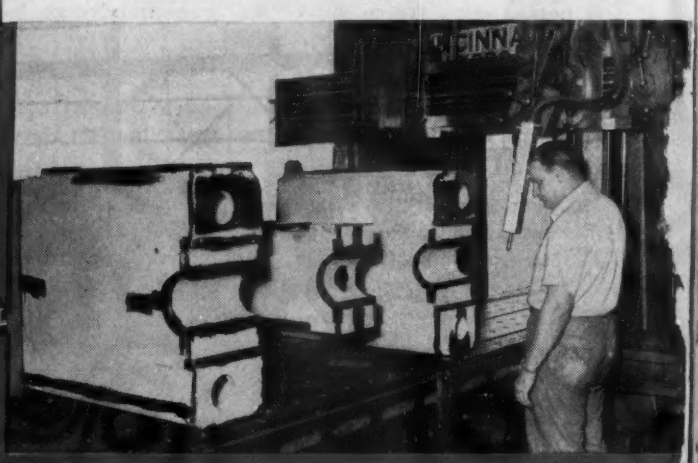

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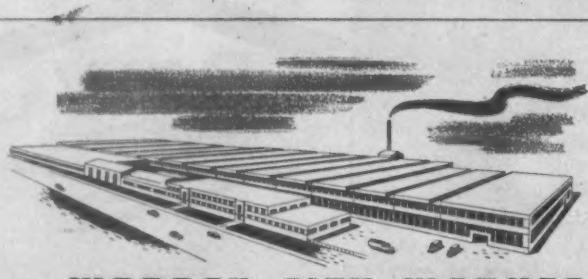

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rent and a fractional per cent of the maximum line speed. Two sources of high current low voltage dc power for electroplating lines are in common usage at the present time: Motor generator sets and rectifiers. Both are being successfully used on these lines.

It is quite probable that other metals will be applied to steel strip continuously using plating similar to that now being used for electrolytic tin and electrogalvanized plate. This development offers many possibilities in the expansion of the use of preplated metals. It has been stated that the automobile industry is giving serious consideration to the possible use of such zinc coated steel for body stock[22]. Increased consideration is also being given to the use of small stampings made from zinc coated steel where the protection of zinc is carried over to the cut unplated edges through electrochemical action.

Because of the uniformity of coating, the use of electrogalvanized steel wire has greatly expanded in the 7 years since it was first produced, and it is reported that several new units have recently been installed[22]. The zinc coating of round wire by electroplating received considerable impetus as a result of the Tainton process[23] which uses a solution developed originally for electrorefining of zinc derived from roasted zinc concentrates which are carefully purified before going into the plating cell (Figs. 3, 4, 7). Instead of soluble anodes, insoluble anodes are used in this process. Lead anodes containing a small amount of silver are preferred[24]. Excellent adhesion of the zinc coating is secured by this process. Coated wire can be drawn almost indefinitely without any rupture of the zinc coating. This process has also been applied to zinc coating sheet and strip stock on a continuous basis[25].

Fig. 5—Schematic diagram of one type of line used in continuous electrogalvanizing[26]

Fig. 6—Rotating cathode test cell described by Swalheim showing anode-cathode relationships in the cell. This cell will prove a valuable laboratory device for evaluating strip plating solutions such as used in electrogalvanizing

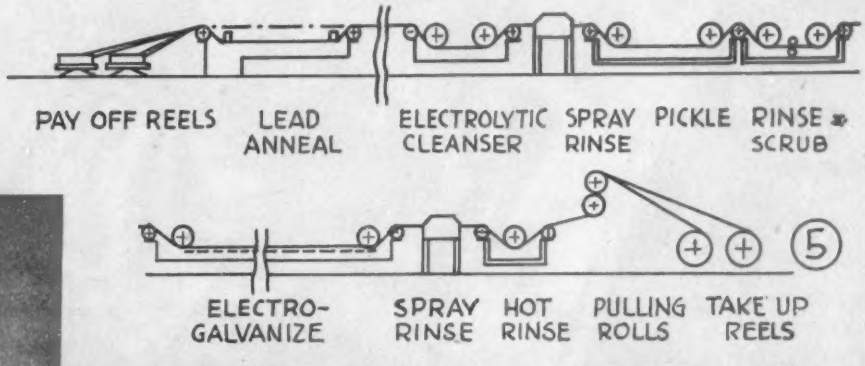
Fig. 7—Zinc plated wire may be drawn to a fraction of its former size without rupturing the coating.

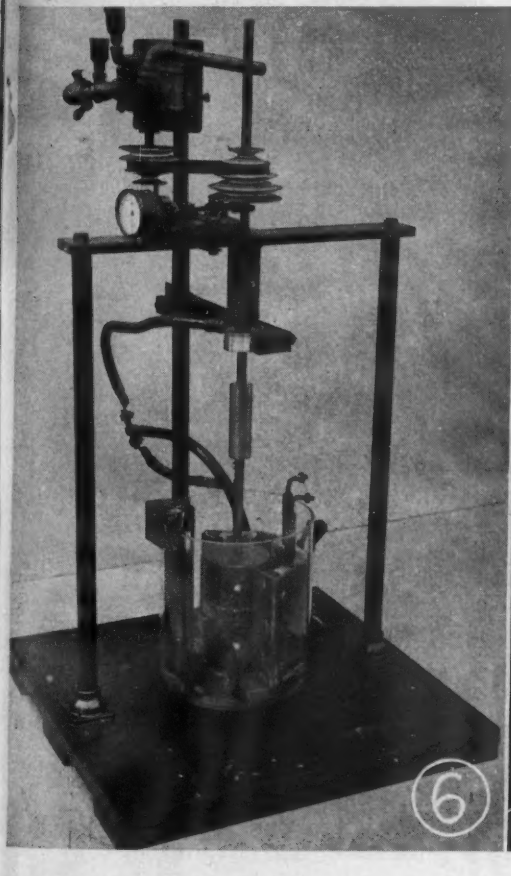
Development and Evaluation of Solutions for Electrogalvanizing

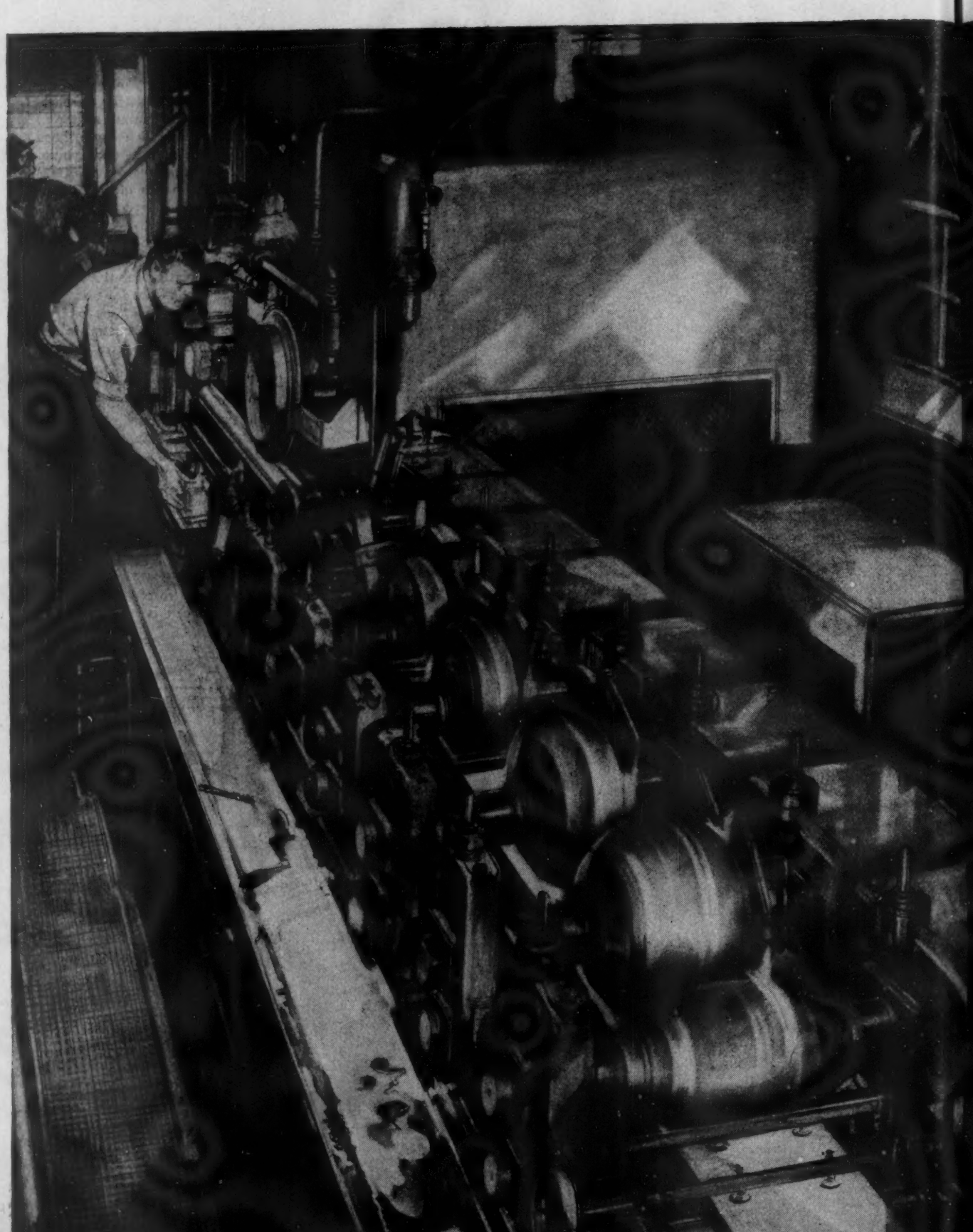
The conditions encountered in the continuous plating of strip steel with zinc differ considerably from those of conventional still and barrel plating operations. As has been pointed out, there are a number of different types of strip steel plating equipment used which differ in design, but the plating conditions encountered are quite similar. The effective solution agitation provided by the rapid movement of the strip as well as by recirculation by pumping facilities is far greater than any agitation previously employed and have rendered obsolete the older experimental methods for development and evaluation of plating solutions.

The test methods which have been devised for the development and evaluation of still and barrel plating solutions do not meet the demands of continuous strip plating with the frequently used relatively high operating speeds and high current densities. For example, one testing device widely used in industry today for still and barrel plating solutions is the Hull cell[26]. The techniques for using the Hull cell in the study of still and barrel plating solutions will be discussed in detail in the section following on cyanide zinc plating.

Dr. Swalheim[27] has described the construction of a laboratory plating cell to meet the problems of strip plating in such processes as electrotinning and electrogalvanizing by employing a rotating cathode to simulate plating conditions which are encountered in commercial strip plating units. The device known as the Du Pont rotating cathode cell, should prove of great value in the development, evaluation, and control of solutions used in electrogalvanizing. Typical of problems applying to continuous electrogalvanizing that can be studied using







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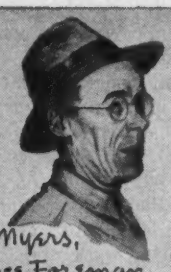

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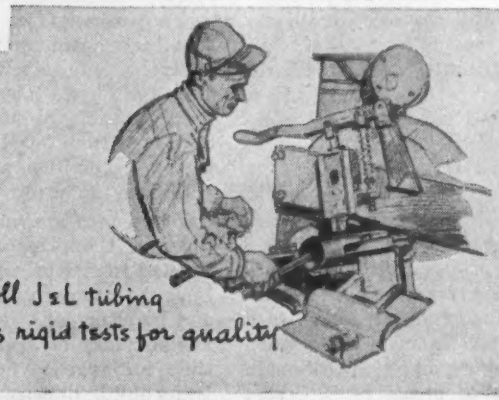

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FROM DRAWING AND SKETCHES MADE AT J&L ELECTRICWELD TUBE PLANT, OIL CITY, PENNSYLVANIA, BY ORISON MACPHERSON

TUBES OF STEEL

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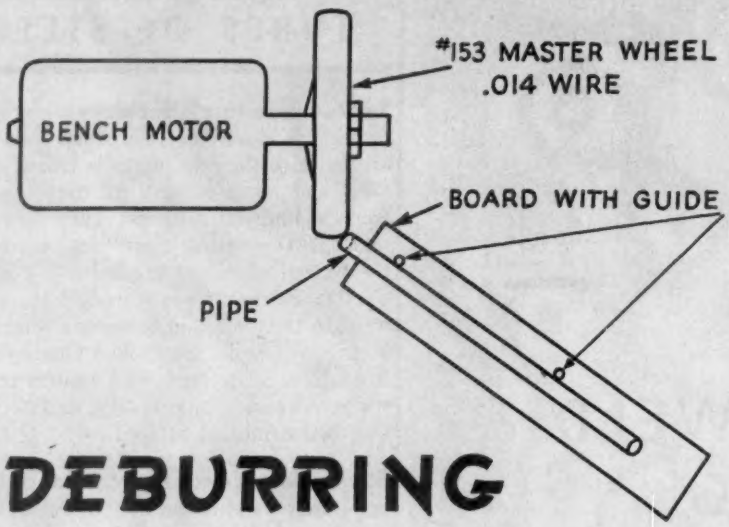
"Steel-Bellied snakes" our troops called the electric-welded steel tubing, adapted to invasion pipe lines, twisting over the land to convey gasoline, oil and water to the fighting fronts. Steel tubing, in 20 ft. sections, 4 in. in diameter, was coupled with a special coupling that enabled men to lock two lengths together in 1 minute. A light truck could carry 1000 ft. of tubing. Two men could handle a length and 20 miles of pipe could be laid in a day. In Africa alone, 1000 miles of this invasion line were in operation. The 4-in. line could deliver 210,000 gals. a day. The 6-in. portable line had a capacity of 400,000 gals.

First pipe for invasion line came from J&L Electricweld plant. Peace-time possibilities are for increased use in irrigation of farms, orchards, truck gardens, as a means to controlled food production, as well as to offset normally arid conditions.

Tubing for furniture, bicycles, conveyors, handles, and playground equipment will now again be produced in large quantities at the J&L Electricweld plant.

***57* tubular members in an automobile** include air intake; oil filler and breather tube; radiator inlet and outlet tube; manifold tube; accelerator shaft and pedal tubing; exhaust and tail pipe, propeller shaft and torque tubes. Accessories include tire pumps and grease guns.



DEBURRING pipe ends in ten seconds

DEBURRING the ends of steel pipe by power brushing is faster and burrs are removed more completely, leaving a uniform radius all around the pipe, according to a manufacturer now employing this method in place of filing or grinding.

Equipment being used is made by Osborn Mfg. Co., 5401 Hamilton, Cleveland. It is 8 in. in diameter, with a 1½-in. brush face of 0.014-in. wire, and is mounted on a bench motor. Pipes are placed in a rack with pin guides to maintain the proper brushing angle (90° from shaft line), as shown in the accompanying schematic diagram, and are turned by hand while in contact with the brush. The motor turns the brush at the rate of 3500 rpm.

Use of power brushes in this operation makes it possible to deburr both ends of a steel pipe in 10 sec. Time consumed for the same operation by filing or grinding varies, but is said to be considerably greater in most instances. The power brush deburring method is believed to be applicable to most types of steel pipe used in industry.

the rotating cathode cell are voltages, plating range characteristics, and cathode efficiencies. It is of importance to determine the effect of different variables on the current density plating range of electrolytes for strip plating because of the relatively high installation cost of equipment and high rates of production desired.

Plating solutions with high operating current densities can therefore be used to advantage resulting in a substantial saving in plater installation and maintenance. In general, the use of the rotating cathode cell shown in Fig. 6 for the determination of the characteristics of strip plating baths, typical of electrogalvanizing solutions, is a step in the direction of providing a means of predicting results which may be anticipated in commercial strip plating units.

Preparation of Base Metal for Acid Electrogalvanizing

Much of the early history of acid electrogalvanizing is concerned with difficulties in cleaning. Unlike cyanide zinc baths the acid baths have practically no detergent properties; thus all work must be thoroughly cleaned before electrogalvanizing. Poor adherence and blistering of zinc plate is usually the result of inadequate cleaning or of the presence of a film of oxide, inhibitor or copper on the steel. Blistering is sometimes caused by excessive hydrogen absorption.

Much cold rolled steel is annealed by passing it through a bath of molten lead at about 1000°F (550°C), which burns off the rolling oils fairly completely according to schematic representation shown in Fig. 5. The hot steel accumulates a light scale which is removed by pickling briefly in sulphuric or hydrochloric acid. If annealing in this manner is not practiced, oil is generally removed by electrolytic cleaning in hot alkaline solution. Common solution compositions are sodium metasilicate or orthosilicate in concentrations of 3 to 8 oz/gal (22.5 to 60 g./l)[29]. The silicates are particularly adapted for this type of cleaning. Often the bath is fortified with additional caustic soda. Formulated cleaners are also offered on the market.

Two requisites of any cleaner should be that it be free-rinsing and exhibit good wetting characteristics. The free-rinsing qualities of a cleaner will depend largely upon its composition. Many ingredients that impart an advantage to a cleaner will detract from its value when used in too great a proportion. Although the cleaning operation may be expedited by the use of excessive amounts of such chemicals, the results will not be a chemically clean surface due to poor rinsing characteristics. Rinsing in any case must be thorough because no soap or grease can be tolerated in the pickle bath or plating solution.

Over-pickled metal cannot be given a satisfactory zinc plate. Hydrogen embrittlement of steel is more serious when coating with zinc which is relatively impermeable to hydrogen than when coating with permeable metals such as nickel[30]. To avoid any embrittlement of the steel to be zinc plated, which, when it does occur can usually be attributed to the pickling operation, acid treatment should be as mild as possible. If steel subject to hydrogen embrittlement often termed "short steel" or "short-tempered steel, is to be galvanized, hydrochloric acid is preferred to sulphuric for pickling; the acid should be dilute, the temperature low, and the time of treatment as short as possible. Inhibitors are helpful if they are removed before plating so as not to cause peeling of the zinc; special treatments are sometimes required[31]. The last step before plating is invariably a rinsing operation and often a combination rinsing and scrubbing operation.

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[31]See Reference 29, p. 282.

Flush Pin Depth Gage Serves Dual Purpose

Flush pin depth gage, combining features of a micrometer and standard gage blocks, enables manufacturers to set it for a particular job and then reset it again and again for various jobs. Gage, made by Schnacke Mfg. Corp., Evansville, Ind., has a micrometer screw, making it possible to set for plus or minus tolerances from 0.001 to 0.002. Screw is locked in position and gaging is done with flush pin at top.

Depth pins are manufactured in multiples of 1 in., depth being set by subtracting from 1 in. and the balance being built up by gage blocks between anvil and body of gage. Various types of anvils also may be applied, making it possible for gage to be used on holes of larger inside dimensions.

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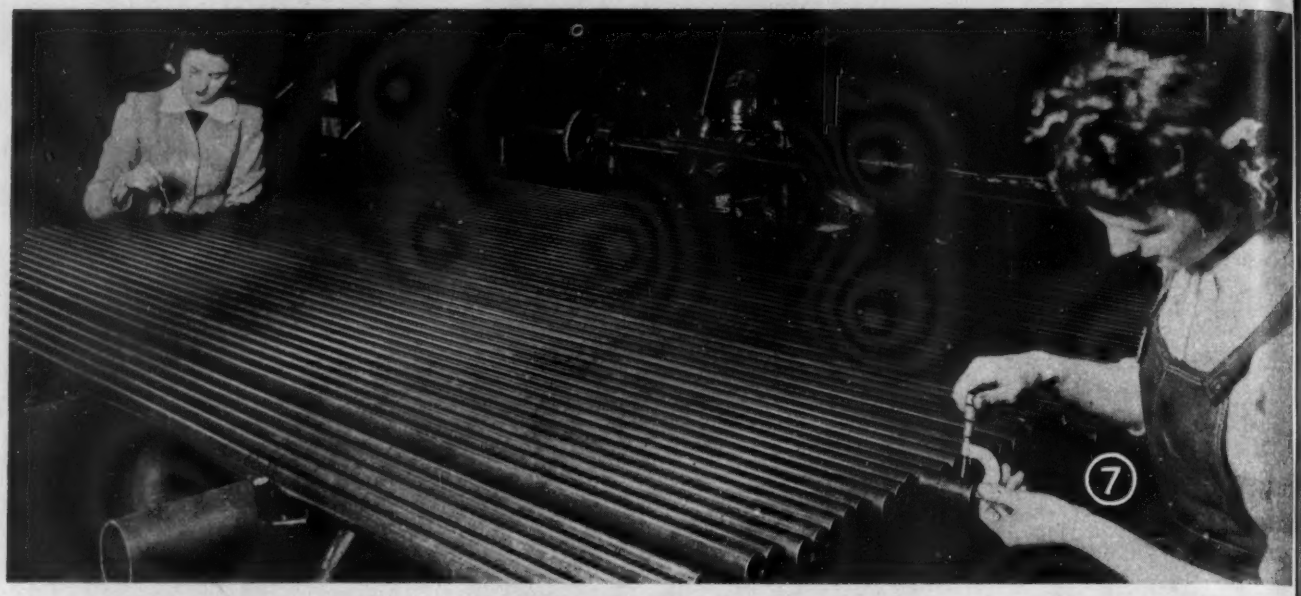

Electric Welded Tubing

(*Continued from Page* 115)

in the pickle bath, and the coils then are stacked on a crate for acid pickling.

The skelp pickle house, 100 x 35 ft, also is an extension of the main bay and is parallel to the boiler house. After pickling and hot rinsing, the staples are removed from the coils, and the coils placed on a conveyor leading to the cold rolling mill.

At the end of this conveyor, a coil of skelp is deposited on a floor-type uncoiling reel from which it is fed into a cold sizing mill. The sizing process affords the first mechanical control of the product, bringing it to the required thickness. A magnetic gage, running on the strip, insures close control of the limits of thickness. The sizing mill is equipped with 16 x 20-in. rolls, the speed of operation depending upon production requirements of the tube welding mills. From the cold sizing mill, the coils of strip are transported by crane on a multiple coil hook, to the storage space provided at the coil box of each welding mill.

At the No. 1 mill, coils are lifted into a multiple coil box by a jib crane as required, and then fed into a leveler. An upcut shear is provided after the leveler so that the ends of the coils may be cropped and cut square for the buttwelding operation which follows.

Coils of strip are buttwelded together to form an endless strip in order to provide uninterrupted operation of the tube mill. The buttwelder is provided with a hydraulically-operated shear to remove the welding flash. A pinch roll is provided after the flash shear, with controls interconnected with those of the leveler in order to permit running of the strip at a higher speed into a loop, prior to entering the tube mill.

Following the buttwelding operation, the strip is slit to exact required widths. This is another control introduced to provide strip of accurate and constant width, and not of variable widths as would be the case if commercial cold rolled strip with its commercial tolerances were used. Slitting also provides fresh edges to the strip, eliminating rust or strip edge damage that might interfere with obtaining strong and sound welds. A slitter in line with the forming mill is provided with such controls as to permit its speed to be synchronized with that of the welding mill.

Fig. 7 — Tubes being micrometer tested for specified wall thickness

Beyond the slitter is a forming mill which brings the flat strip into cylindrical form preparatory to welding. This mill has seven roll stands though not all are used for the smaller tube sizes. The formed tubing then passes into a 250-kva, 360-cycle resistance welder. Beryllium copper electrodes contact the upper surfaces of the formed tube on either side of the seam. Pressure rolls positioned directly beneath the electrodes provide the pressure required to bring the edges of the tubing into contact. Following the welding of the edges, the outside and inside beads that are formed in the welding operation are removed by tools installed in the line of progress. The inside weld bead is well trimmed within the specified height. The outside bead is wound on a friction clutch driven reel and disposed of as required.

A 3-pass sizing and straightening mill is installed just beyond the resistance welder, to accurately size the tubing and to straighten it with reasonable accuracy. The welded tubing as it emerges from the sizing mill is cut to the required length by a flying rotary cutoff. The cut lengths of tubing proceed on and down a conveyor at the end of which they are discharged sidewise onto another conveyor feeding the bright annealing furnace.

A 75,000-gal oil storage tank has been provided to store oil for firing the two

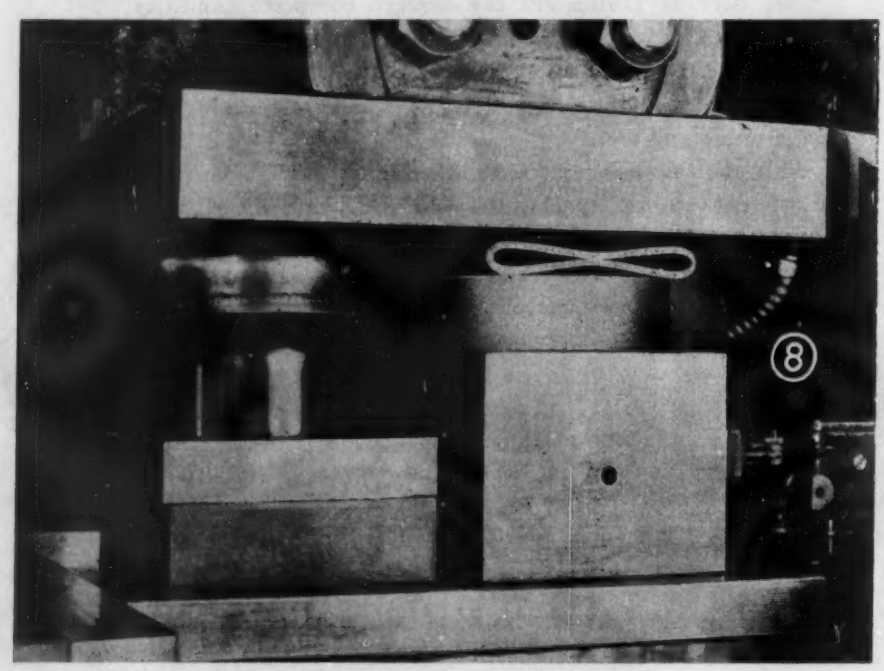

Fig. 8—Samples of tubes subjected to flattening and expanding-crush testing methods

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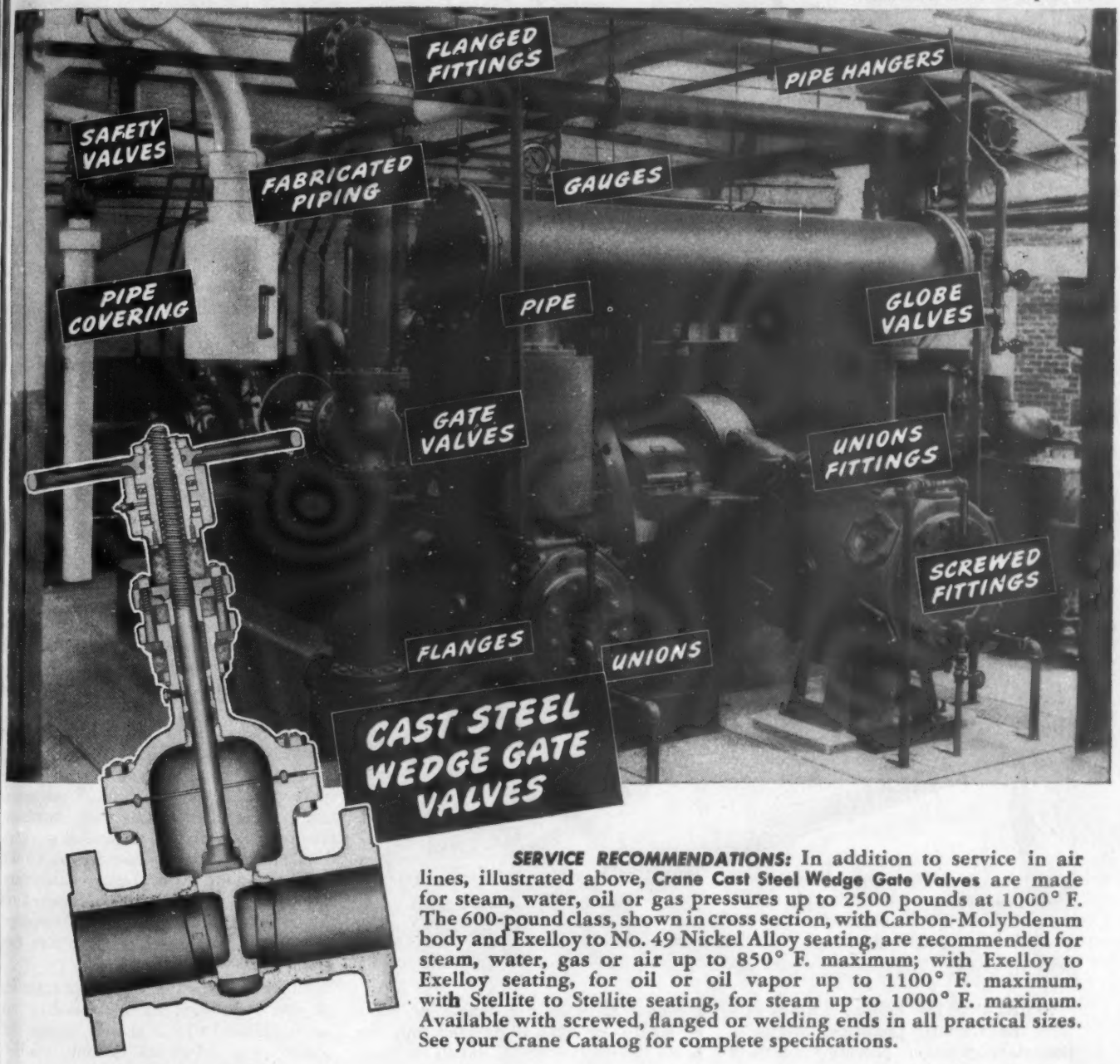

SERVICE RECOMMENDATIONS: In addition to service in air lines, illustrated above, **Crane Cast Steel Wedge Gate Valves** are made for steam, water, oil or gas pressures up to 2500 pounds at 1000° F. The 600-pound class, shown in cross section, with Carbon-Molybdenum body and Exelloy to No. 49 Nickel Alloy seating, are recommended for steam, water, gas or air up to 850° F. maximum; with Exelloy to Exelloy seating, for oil or oil vapor up to 1100° F. maximum, with Stellite to Stellite seating, for steam up to 1000° F. maximum. Available with screwed, flanged or welding ends in all practical sizes. See your Crane Catalog for complete specifications.

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bright annealing radiant tube furnaces during the winter months, gas being used for firing during the summer. These furnaces, which are built with a 6-ft wide hearth, each have a capacity exceeding 5 tons per hour. They are also arranged to provide an oxide finish to the tubing that is rust retardant.

On the No. 2 mill, where coils are considerably heavier, a mechanical feeder is provided ahead of the leveler. The same sequence of operation is followed on this mill, namely, leveling, and cropping, buttwelding, flash shearing, feeding into a loop, slitting the edges, forming, welding, sizing and straightening, cutting to length and conveying the tubing into a second bright annealing furnace. The resistance welder in this line is a 500 kva, 180-cycle machine.

Attached to the slitter in each line of operation, is a scrap chopper for chopping up the slit selvage edges cut from the strip. The chopped selvage is deposited into a bucket for easy removal as required.

When the tubing emerges from the bright annealing furnaces, a conveyor discharges the tubes sidewise for running the tubing through rotary straighteners. Tubing emerging from the straighteners is discharged on to conveyors which feed cutoff machines for cutting each tube to exact length, and also for cutting long tubes into shorter lengths as required. As required coupons cut from the ends of tubes produced by the tube mill are conveyed to presses where they are tested according to specifications. A coupon is flattened with the weld at the flattened edge, and another coupon expanded and crushed, both procedures being designed to test the strength of the welded tube. The continuous testing of coupons is done on two presses in each mill lineup, each being equipped with safety retracting die supports.

The tubing discharged from the cutoff machines is then conveyed into double and semiautomatic end-burring machines, where the tube ends are chamfered inside and outside, and at the same time trimmed to exact length. Some tubing produced requires that the inside be reamed for 3 or 4 in. within each end. This reaming is also done simultaneously with chamfering, in these double end semiautomatic machines.

Underground Preliminary Inspection

Tubing discharged from the end-burring and reaming machines is conveyed to preliminary inspection racks before proceeding to hydrostatic testing machine. Two hydrostatic testers in each mill line subject all pressure tubing to pressures from 1000 to 6000 psi or as required by specifications. In these machines the high testing pressure is maintained for several seconds, timed by automatic timers, during which time the tube is struck with mallets to vibrate it. A fifth hydrostatic tester in the 160 x 220-ft transept bay adjoining the south end of the main bay augments the four other testers, to take care of excess production.

After testing, the tubing is conveyed into the transept bay for final inspection and shipping, and also for salvaging such tubes as may have become work-damaged enroute on the conveyer system. Those few tubes which inspection shows to have a bead height of more than the limit specified are reworked to reduce this bead to the required limit.

Tubes before shipping are oil dipped in one of several specified oils, to resist rusting as may be required.

Fully-equipped machine shops, hardening and grinding shops, have been provided for the complete manufacture of all tooling such as all rolls for forming, welding, sizing and straightening, and for miscellaneous accessories for other equipment, as are required from time to time. Maintenance work is also done by these shops.

East of the main plant is located a modern locker room building with showers, and also modernly equipped first-aid room and personnel department office. Farther to the east is a two-story office building housing the sales, production, purchasing, accounting and engineering personnel. The basement floor contains modern physical and chemical laboratories for metallurgical inspection of raw materials and control of finished products.

SPRAY-BOOTH LIGHTING

should provide adequate illumination, safety, and easy servicing

SPRAY-BOOTH lighting involves three fundamental problems: Making a fire-safe installation; providing adequate lighting; and making servicing easy and minimizing the cleaning problem. The lighting system will not be a fire hazard if the following precautions are observed, according to W. H. Kahler, lighting engineer of Westinghouse Electric Corp., Cleveland: Approved vapor-tight luminaires are used; lighting equipment is mounted flush in the ceiling or walls of booths, or light is directed into the booth from the front; booth is well ventilated by approved means; and installation is inspected by a local inspection authority.

If white is applied over a dark surface, 10 to 20 foot-candles of illumination are satisfactory. If a dark finish is applied over a dark surface, at least 50 foot-candles of illumination are required to give sufficient contrast between the finished and unfinished areas. As most booths are for both high and low contrast painting, the higher level is recommended.

Fluorescent units are preferred for eliminating harsh shadows. This lighting is the predominating type demanded for spray booths because high footcandles can be obtained at minimum wattage, minimum radiant heat improves worker's comfort, long source minimizes shadows, and low brightness cuts down direct and reflected glare. Vapor tight luminaires should be specified with a heat tempered ¼-in. thick glass cover, using either two or three 40-w lamp units.

Fluorescent luminaires can be installed in several different ways, depending upon conditions. Type shown in the accompanying illustration is long, shallow cabinet booth with six 500-w incandescent fixtures mounted over glass ceiling panels. Illumination in service depends upon the frequency of cleaning. Paint residue can be removed easily with a cloth if glass panels are coated with a light petroleum jelly. Daily cleaning is recommended.

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MULTIPLE GAGING... provided by special instrument which

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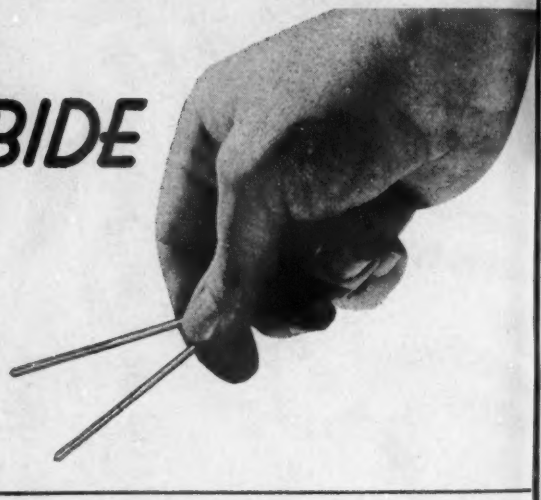
ACCURATE and rapid check of outside diameters of a master camshaft is provided by a "tailor-made" multiple electric gaging instrument developed by Sheffield Corp., Dayton, O. The Multichek unit, shown in accompanying illustration, simultaneously indicates accuracy of each dimension through light signals on the diagram panel at top of unit. Gage heads which are being checked here by master gages are connected to both red and green signal lamps mounted behind a common port in the light case. Lights remain off when dimensions are within tolerable limits. Port shows red if dimension is under minimum limit, green if over. Operator watches master light above gage heads in center of panel, as it remains off when dimensions being checked are within limits. When master light flashes, operator refers to diagram panel to determine point of error.

This instrument is recommended for inspection of large numbers of parts. Although built with standard units, it is made to meet individual requirements. From two to more than 20 dimensions may be checked simultaneously.

Miniature TUNGSTEN CARBIDE

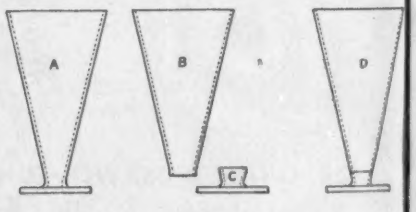
Reamers Now Being Made



SOLID tungsten carbide reamers in sizes as small as 0.125-in. diameter and about length of an index finger are being made by Super Tool Co., Detroit. Clean-cutting and long wearing reamers are produced in sizes as small as 0.09375-in. However, sizes below 0.125-in. will continue to be produced only on special order, but blanks are said to be more readily available and deliveries quicker.

REDESIGNED SHAPES

. . . enable manufacturer to dispense with much machining, and to speed fabrication by welding



RECENT experience in redesigning a munitions item demonstrated how advantage frequently can be taken of available shapes and how the combination of available shapes with small stampings often turns out to be the best solution for a production problem. Diagram shows an ingenious change in design which made it possible to dispense with a large amount of machine work, consequently improving production rates, according to the Resistance Welder Manufacturers Association, Cleveland. Part shown at A originally was designed as a hollow forging which required a large amount of machining to reduce wall thickness to the specified dimension. In order to speed production and lower cost, a study was made of the possibility of fabricating it by resistance welding. It was natural to consider first the possibility of sectioning the piece longitudinally and flash welding two stamped sections together. This, however, would have involved some difficult problems of die construction for both stamping operations and the welder. A better method consisted of flash welding two pieces of the general shape in B and C. Part B was made by taper swaging the required lengths of seamless steel tubing of the correct outside diameter and wall thickness. At the small end of the taper, a straight tube section is provided, slightly greater in length than the amount of material that would be lost in the flashing and push-up. Part C was produced as a stamping from material of the same wall thickness as the tube. This part also has a straight tube section corresponding to that of part B, to allow for flashing and push-up. In other words, the two parts were identical in section at the areas where they were to be joined, and therefore presented satisfactory conditions for flash welding. The assembly reproduced the shape and dimensions of the original part as shown at D. Removal of the flash after welding is only a minor punch press operation compared to the amount of machine work necessary when this part was made from previous method.

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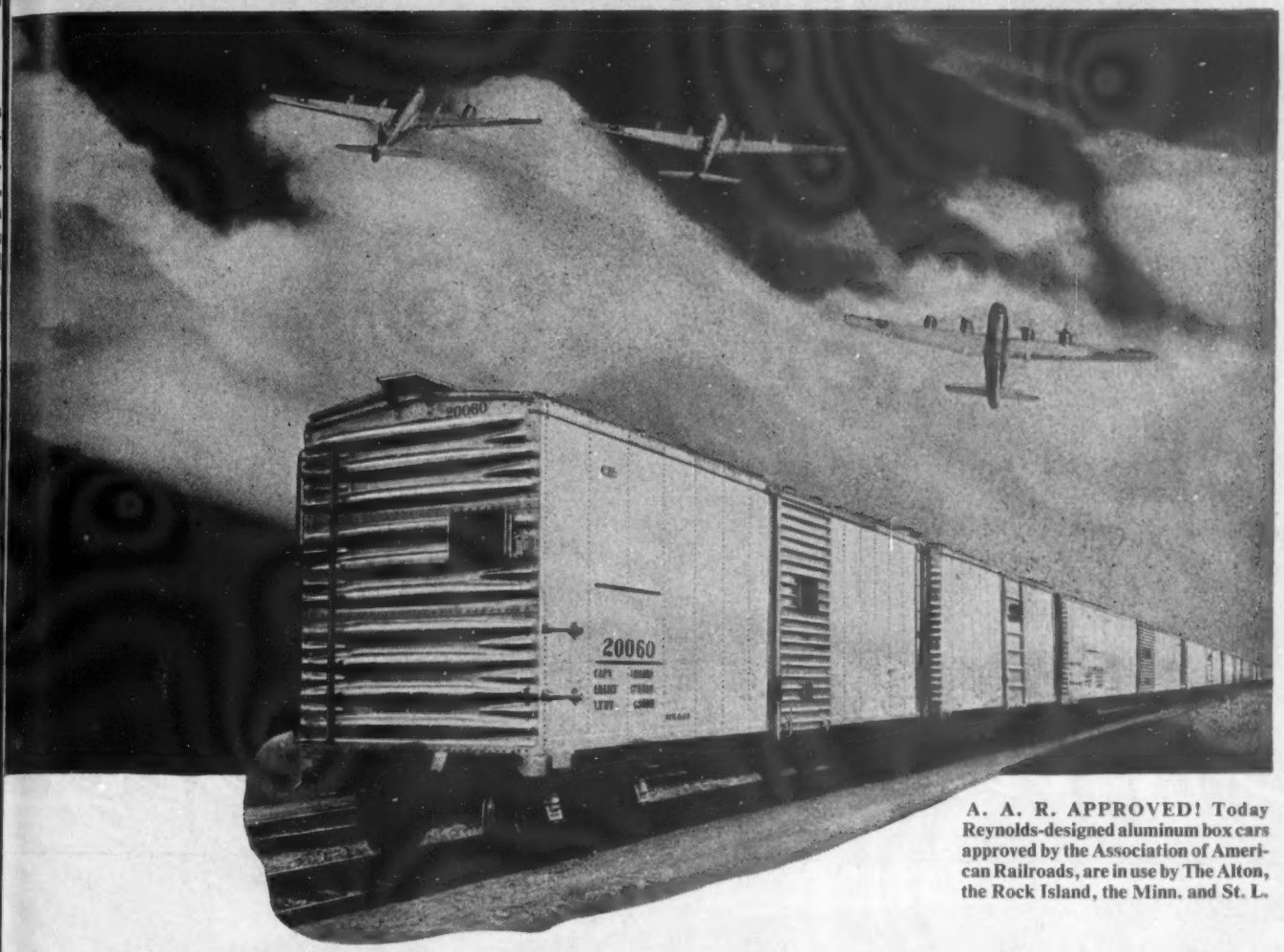

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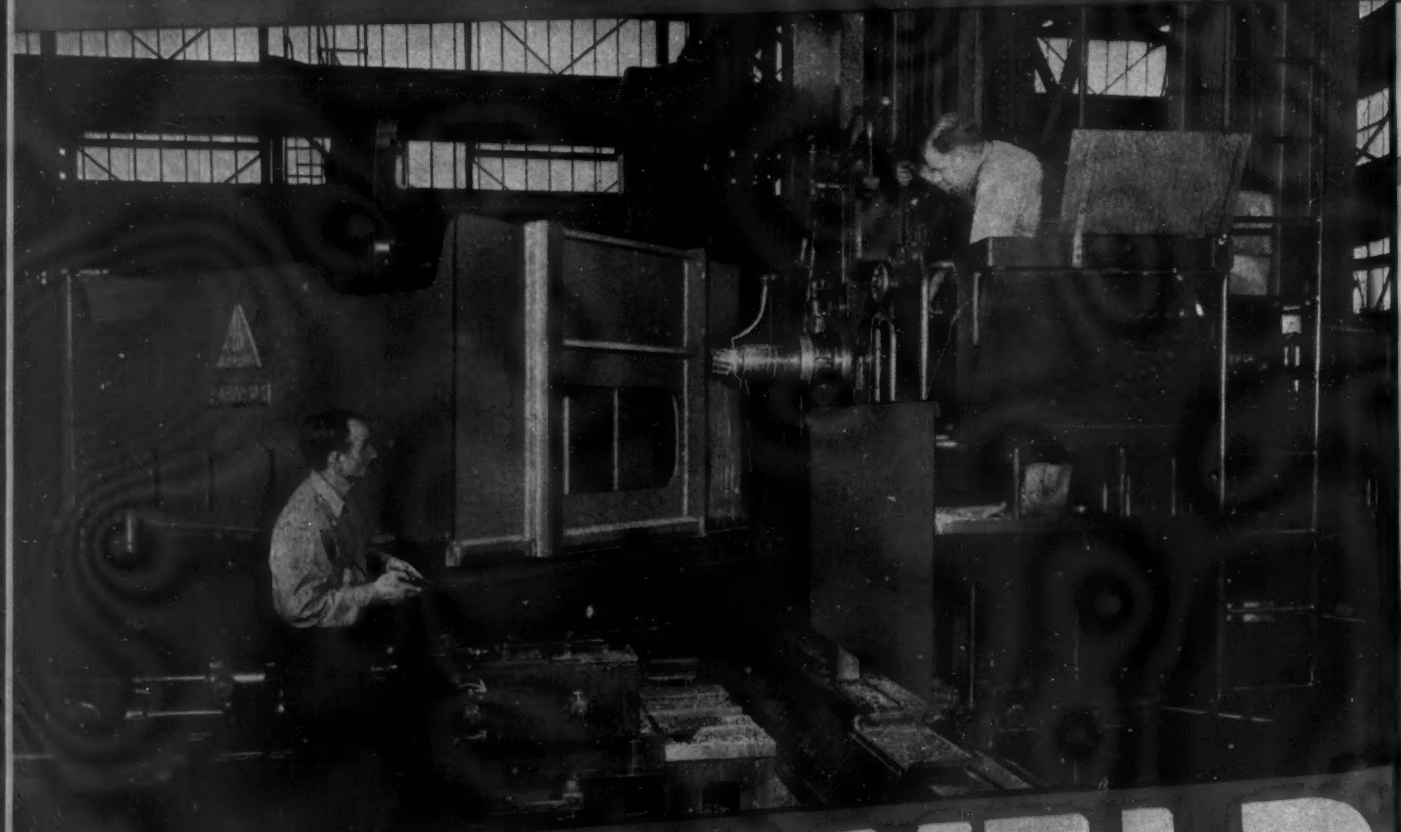
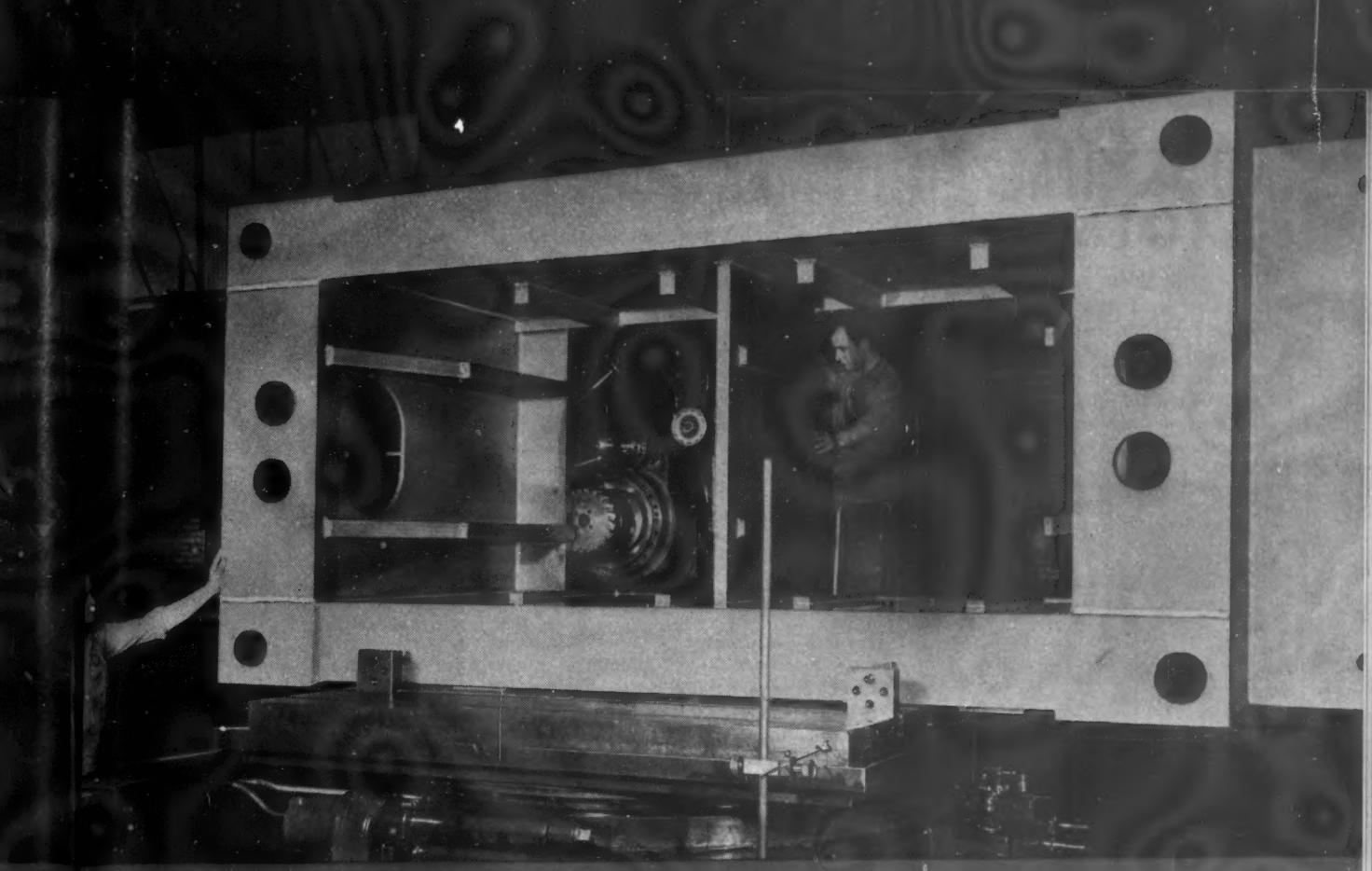


DANLYWELD



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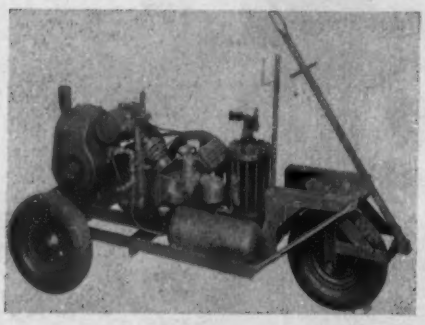
Compressor Unit

Model No. 2000 aircraft compressor unit offered by Pacific Airmotive Corp., 6265 San Fernando road, Glendale, Calif., is designed for dual service. On high pressure service it will deliver compressed air to 2000 psi for spraying, tire inflation and other low pressure air requirements. The compressor is equipped with a con-

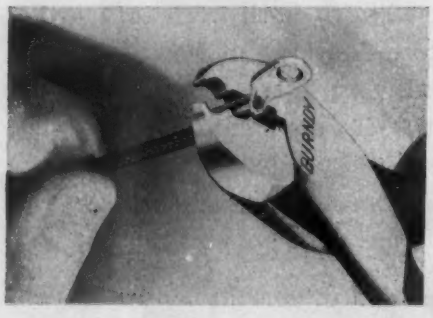


stant speed unloading system which is operative both on 100 lb low pressure service and 1500 to 2000 lb high pressure service with simple changeover shifting from one service to the other. The interstage is equipped with adequate intercooling coil and mechanical water and oil trap. A specially designed finned aftercooler is incorporated in the unit and connected to high pressure mechanical trap on final delivery.

Features of this unit include: Combination tow hitch and manual tongue; high pressure dehumidifier container for 2000 lb working pressure (silica gel); low pressure air receiver with safety valve; high and low pressure valves, high and low pressure gages; air adapter valve; 20 ft length high pressure air hose, coupled.

Electrical Connectors

Electrical connectors for small size aluminum wires and cables which provide permanent, low resistance connections are announced by Burndy Engineering Co.,



107 Bruckner boulevard, New York 54.

In the manufacture of these connectors, zinc is plated on oxide-free aluminum to prohibit reformation of the oxide film once it has been removed, and provides the connector with a low-resistance contact surface. Barrel of each connector is then filled with petrolatum jelly in which zinc dust is suspended. Thus, when the cable end is inserted into zinc-filled barrel, zinc compound is forced in between individual strands. Then as connector is indented to cable with the Hytool, zinc particles tend to break through the oxide film on each strand as the wires are forced to rearrange themselves and wipe against one another under pressure of indenting tool. These aluminum connectors are available for the complete range of aircraft electrical conductor sizes.

Hardness Tester

Clark Instrument Inc., 10200 Ford road, Dearborn, Mich., announces a new model hardness tester to handle large or cumbersome parts. It gives a true rockwell reading, using either a diamond or steel ball penetrator, both furnished as

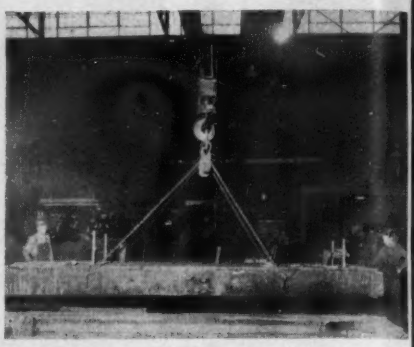
standard equipment with the machine. The unit can handle parts ranging from ½ to 26 in.

Provision is made for raising or lowering the table by a hand crank. Position of the capstan, mounted on side of the machine, may be correspondingly adjusted in relation to the table height. Heavy parts are loaded onto a roller bearing carriage on the table. Readings are taken in the same way as with an ordinary tester. By means of the capstan the indicator is set at zero on the minor loads. Major load weight is released and a direct hardness reading is taken from the indicator.

Chain Slings

Hercules Sling Co., Rockford, Ill., introduces a complete line of Safe-T-Lift automatically equalizing chain slings made in 4, 7, 14, 25 and 40 tons capacities. To operate the sling the block or chain equalizer unit is placed on the crane hook and the crane operator spots the hook over approximate center of gravity of the load. Floormen then attach the sling's chain legs to the load.

Power to lift load is applied by crane operator and as crane hook rises the sling's chain automatically adjusts itself through the equalizing unit. Unit consists of a steel block and a floating sheave constructed to fit the steel alloy chain. When loads are lifted, one chain leg be-

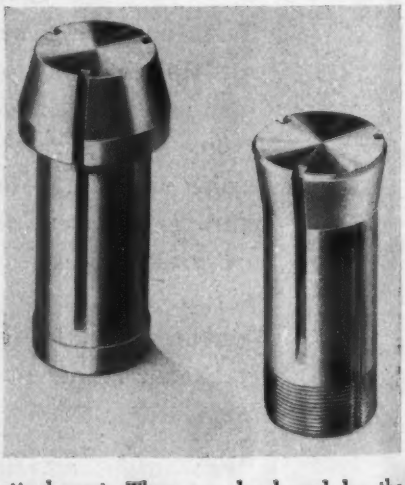


comes longer than the other and as weight of load pulls on chain, sheave in equalizing unit pulls down against brake, preventing slippage.

If crane operator does not get crane hook and equalizing unit close enough to load's center of gravity, the load is lowered enough to relieve tension on sling and release the brake. Crane hook is then moved over to true center of gravity and when power is applied the chain readjusts for level lifting.

Soft Collet Blanks

Zagar Tool Inc., 23880 Lakeland boulevard, Cleveland 17, offers No. 2 W & S and 5-C types of blank collets machined all over except for the hole, in soft condition to fit any standard collet



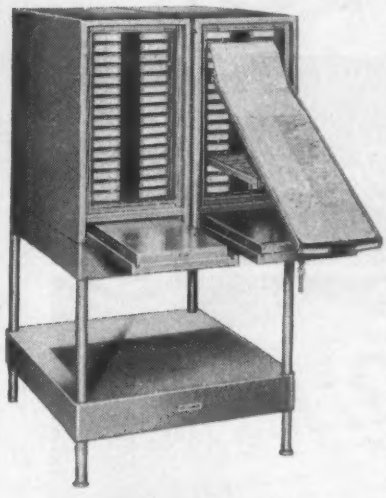
attachment. They can be bored by the user to meet his own specifications, eccentric, special size hexagon or square, limited depth or irregular hole. Blank is mounted in any standard collet fixture and finish machined to specifications. Instructions are included to anneal, split with a rubber wheel and spring.

All claims are those of the manufacturer of the equipment being described.

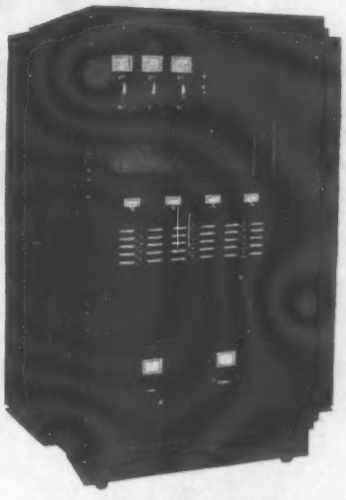
STEEL RETURNS!

. . . designed to complement today's improved record controls

ARISTOCRAT STEEL FILES
for Long, Dependable Service

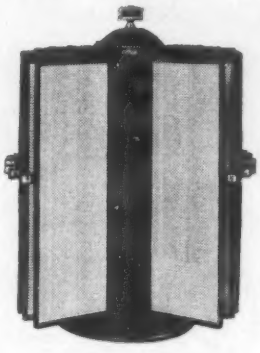


MODERN SAFE-KARDEX
for Visible Administrative Control

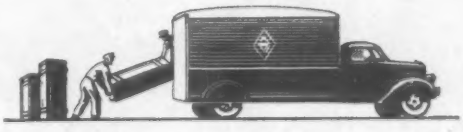


SAFE-CABINET EQUIPMENT
for Certified Fire Protection

STEEL LEDGER TRAYS
for Machine Posted Records



VISIBLE INDEXING EQUIPMENT
for Fast, Accurate Reference



DELIVERIES of steel equipment necessarily follow the sequence in which orders are received. Under present conditions, prompt decision is suggested.

It's good business to combine Equipment VALUE and Methods ECONOMY!

War production experience taught us new facts about performance, structural strength, refinement of design . . . and we have put them all into new and improved steel office equipment, now in production!

This is the time to combine the long-term investment value of steel housing and *record-protection* with more efficient *record-control* methods. Many improved systems, especially developed to speed production of war materials, can now be applied advantageously to increase peacetime operating efficiency.

Talk over your requirements with a Systems Technician. He can point out opportunities to economize with modern steel equipment, simplify administrative control and obtain important record-keeping savings.

Just call our nearest Branch Office.

SYSTEMS DIVISION

REMINGTON RAND

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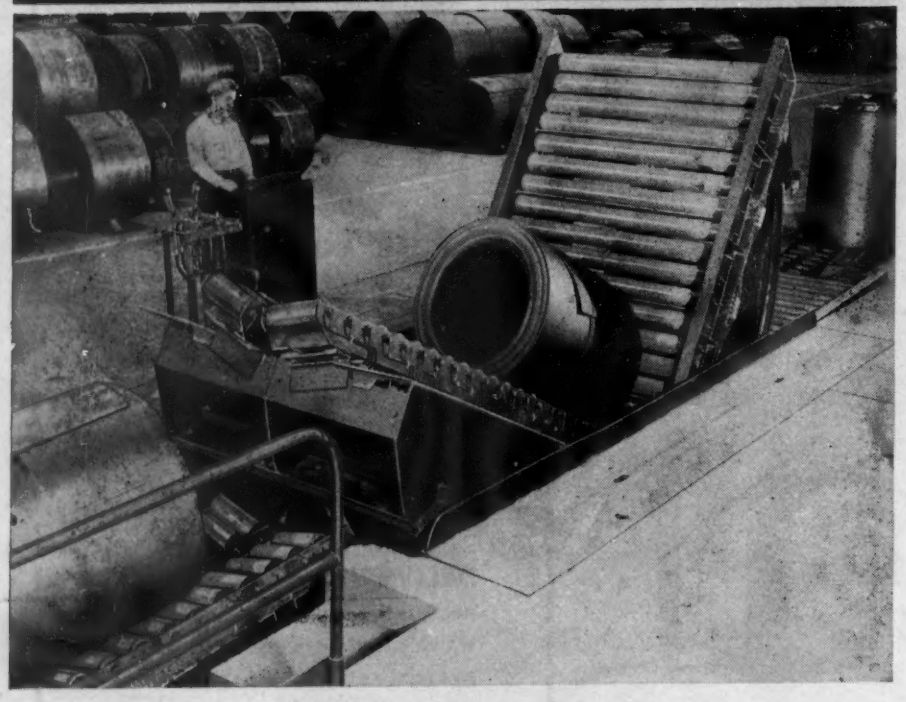
Mathews

COIL HANDLING CONVEYERS

Engineered to serve Production



Mathews Engineers have accumulated many years of experience in the development of coil-handling conveyers. This concentrated effort has resulted in high-quality up-enders and down-enders, combination up-enders and side tilters, troughed roller conveyer, turntables, and tail pullers. There is a Mathews Engineer operating in your vicinity. He will be glad to show you what has been done in the handling of steel, brass, and aluminum coils. He will also give you data concerning the many other types of Mathews Conveyers which have been engineered to serve production.

MATHEWS CONVEYER COMPANY
ELLWOOD CITY, PENNSYLVANIA
SAN FRANCISCO, CAL. • PORT HOPE, ONT.
ENGINEERING OFFICES IN PRINCIPAL CITIES

Container Line

(*Concluded from Page* 113)

and two operators can handle the comparatively long tubular sections easier than a single worker.

After inspection and before the first necking operation, the containers are run through a machine that wire brushes the seam inside and out to remove any adhering melt material that may have been fused to the metal. Containers then go through a shaper to remove the bead on the end that is to be necked down.

Subsequent necking down or swedging of the container is accomplished in the press setup shown in Fig. 8. Here a number of dies are arranged to do the work in several stages.

Finishing of the containers involves addition of bottom plate, spacer rings and various fittings. Then they are ready to receive a shell and guard it till the time it goes into a gun.

Output from the production line shown here averages about 6400 containers per day. This amounts to three carloads, there being about 2160 containers to a car.

All photos from the Linde Air Products Co., New York.

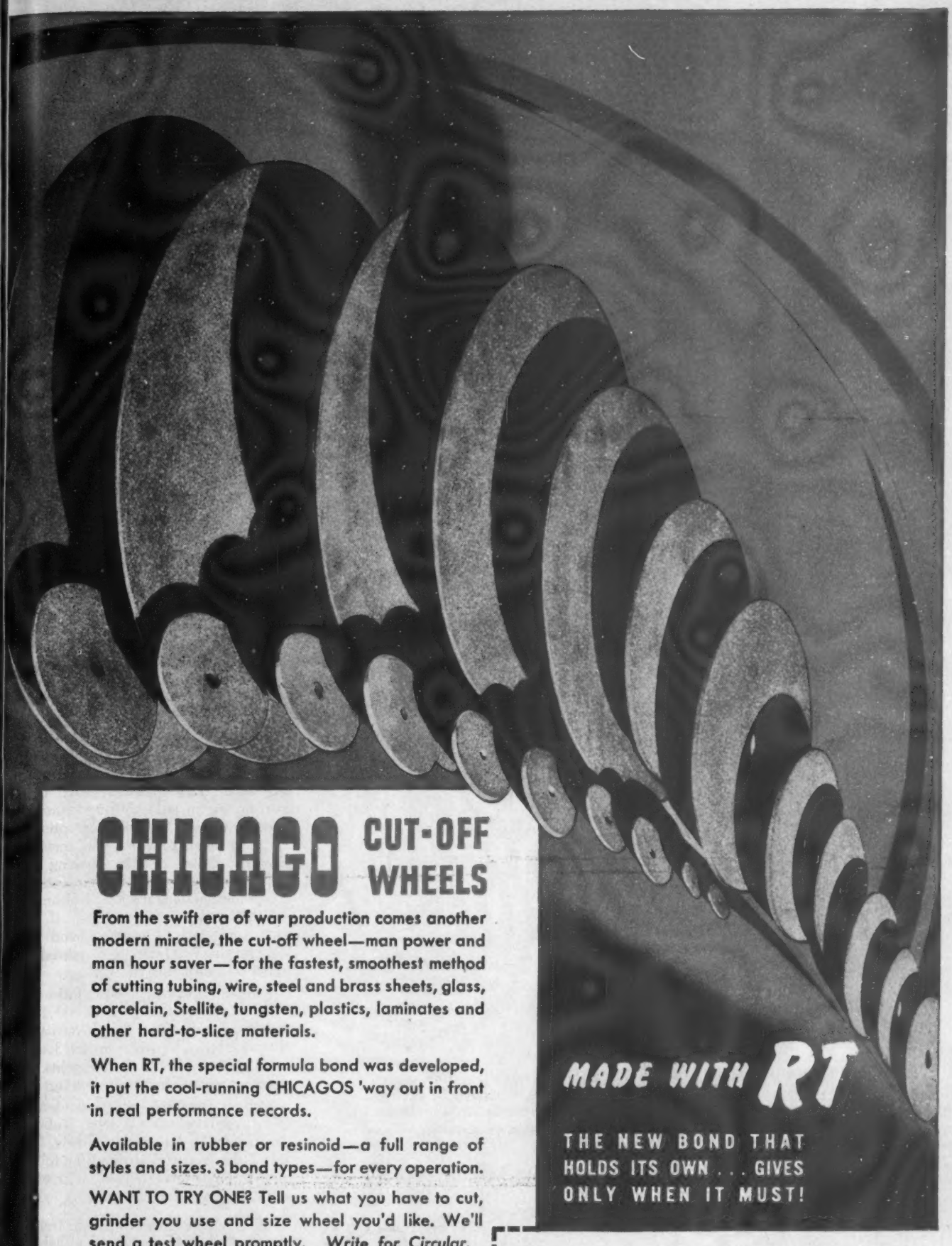
Aluminum Flux Suitable For Brazing and Soldering

A flux for aluminum fabricators combines in one formula a product serving equally well as a flux for aluminum soldering, aluminum brazing, or aluminum gas welding. It can be used with aluminum brazing rods to braze either rolled or cast aluminum, and also in combination with the proper welding rods to weld either rolled or cast aluminum. In addition, it does a good soldering job with ordinary 50-50 tin-lead solder.

Compound has relatively low melting point and retains its activity over a wide range of temperatures. It also has high fluidity, is a satisfactory cleaning agent, and insures a strong joint, according to the manufacturer, American Solder & Flux Co., Philadelphia.

Identifying Stencil Eliminates Smearing

An identifying stencil for use on tubing and bar stock completes job in less time with four people than with 40 formerly required at Glenn L. Martin Co., Baltimore. Holder is rectangular in shape, with an open top, and the stencil forms the bottom. Linen, used in preference to paper stencils because it wraps more securely around stock and does not smear as easily, is suspended by springs from small flanges at top edge of holder. When holder is pushed down over top surface of stock, it wraps itself tightly. After spraying stencil from open top, holder is lifted, and springs pull off linen stock. This is said to result in a perfectly stenciled number with no smearing.



CHICAGO CUT-OFF WHEELS

From the swift era of war production comes another modern miracle, the cut-off wheel—man power and man hour saver—for the fastest, smoothest method of cutting tubing, wire, steel and brass sheets, glass, porcelain, Stellite, tungsten, plastics, laminates and other hard-to-slice materials.

When RT, the special formula bond was developed, it put the cool-running CHICAGOS 'way out in front in real performance records.

Available in rubber or resinoid—a full range of styles and sizes. 3 bond types—for every operation.

WANT TO TRY ONE? Tell us what you have to cut, grinder you use and size wheel you'd like. We'll send a test wheel promptly. *Write for Circular.*

CHICAGO WHEEL & MFG. CO.

Originators of the famous Chicago Soft Rubber Polishing Wheels

1101 W. Monroe St., Dept ST, Chicago 7, Illinois

MADE WITH RT

THE NEW BOND THAT HOLDS ITS OWN . . . GIVES ONLY WHEN IT MUST!

Send CIRCULAR____ SEND TEST WHEEL____ SIZE____ TO CUT____

NAME _____

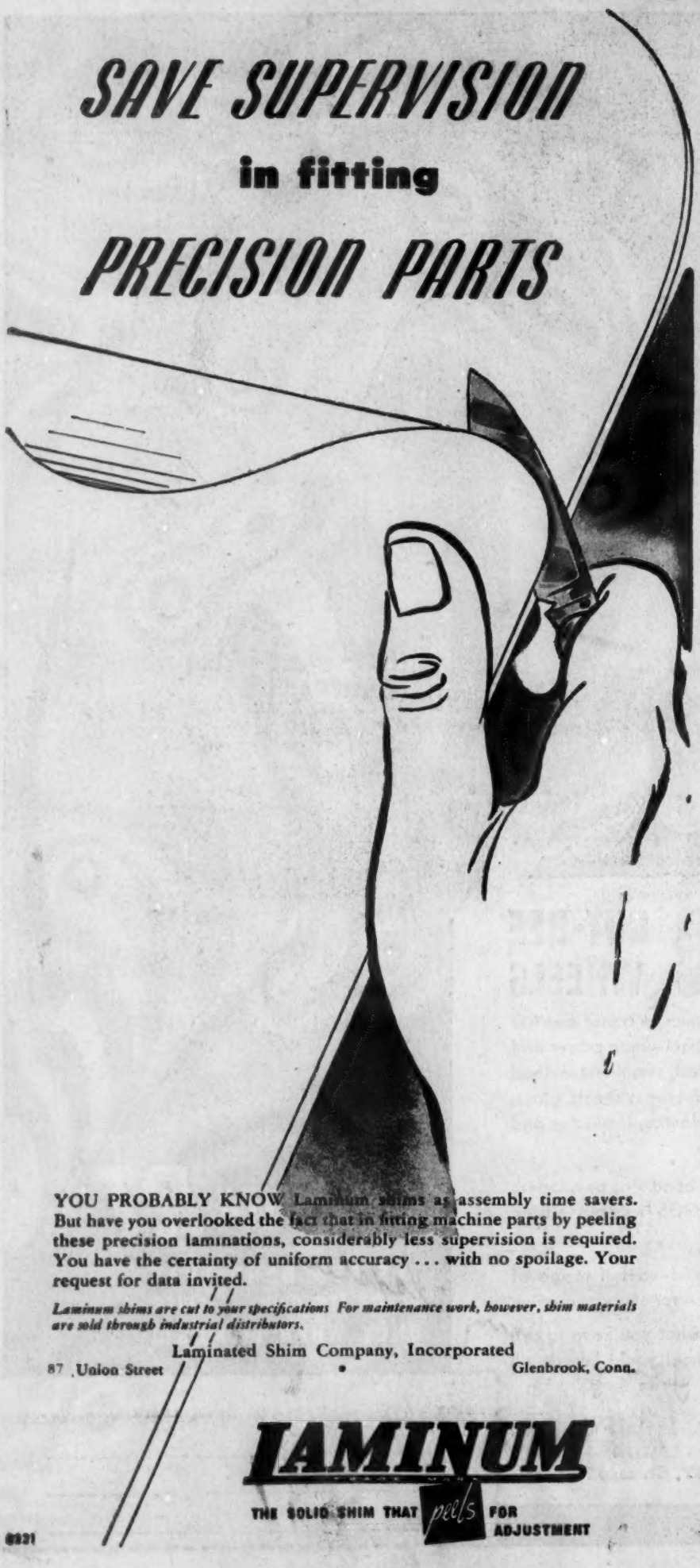
ADDRESS _____

CITY _____ STATE _____ ST

SAVE SUPERVISION

in fitting

PRECISION PARTS



YOU PROBABLY KNOW Laminum shims as assembly time savers. But have you overlooked the fact that in fitting machine parts by peeling these precision laminations, considerably less supervision is required. You have the certainty of uniform accuracy . . . with no spoilage. Your request for data invited.

Laminum shims are cut to your specifications For maintenance work, however, shim materials are sold through industrial distributors.

Laminated Shim Company, Incorporated

87 Union Street • Glenbrook, Conn.

LAMINUM

THE SOLID SHIM THAT *peels* FOR ADJUSTMENT

0321

Twin Drive Motors

(Continued from Page 123)

of electric service in the steel plant is concerned, the principal methods by which the maximum utilization can be obtained are, first, by the proper selection of equipment so as to secure the most economical operation of the individual applications, second, by maintaining demand control so as to utilize to a maximum extent the power available and to benefit by the rate reductions it provides and, third, to minimize losses in the electrical distribution system by power factor correction and by proper design and installations.

By replacing steam operated pumps with electrically-driven equipment for producing hydraulic water for mill use, approximately 15,000 lb of steam per hr were saved in addition to making possible lower hydraulic water costs. Wherever the exhaust can not be used to advantage, we have attempted to replace steam by electric pumping equipment.

A new type interrupter switch was described by L. W. Long, Allis-Chalmers Mfg. Co., Milwaukee, who as co-author with J. F. Chipman of the same company, presented a paper on "Arc Furnace Switching." The switch was installed by the Timken Roller Bearing Co. as a furnace switch in the 23.4 primary of a 12,000 kva, 3-phase, 60 cycle transformer supplying a 19-ft, 60-ton arc furnace.

Maintenance Is Simplified

He drew attention to the ease and simplicity of maintenance. Visible inspection of the entire switch and its auxiliaries can be accomplished by one man during an ordinary furnace recharge period, since all but the interrupting contacts are open to view, and removal of six cap screws permits opening of an interrupting chamber for inspection. A complete maintenance job of cleaning insulators and inspecting, and, if necessary, replacing all contacts, and checking mechanical details involved only about 2 man-hours of work.

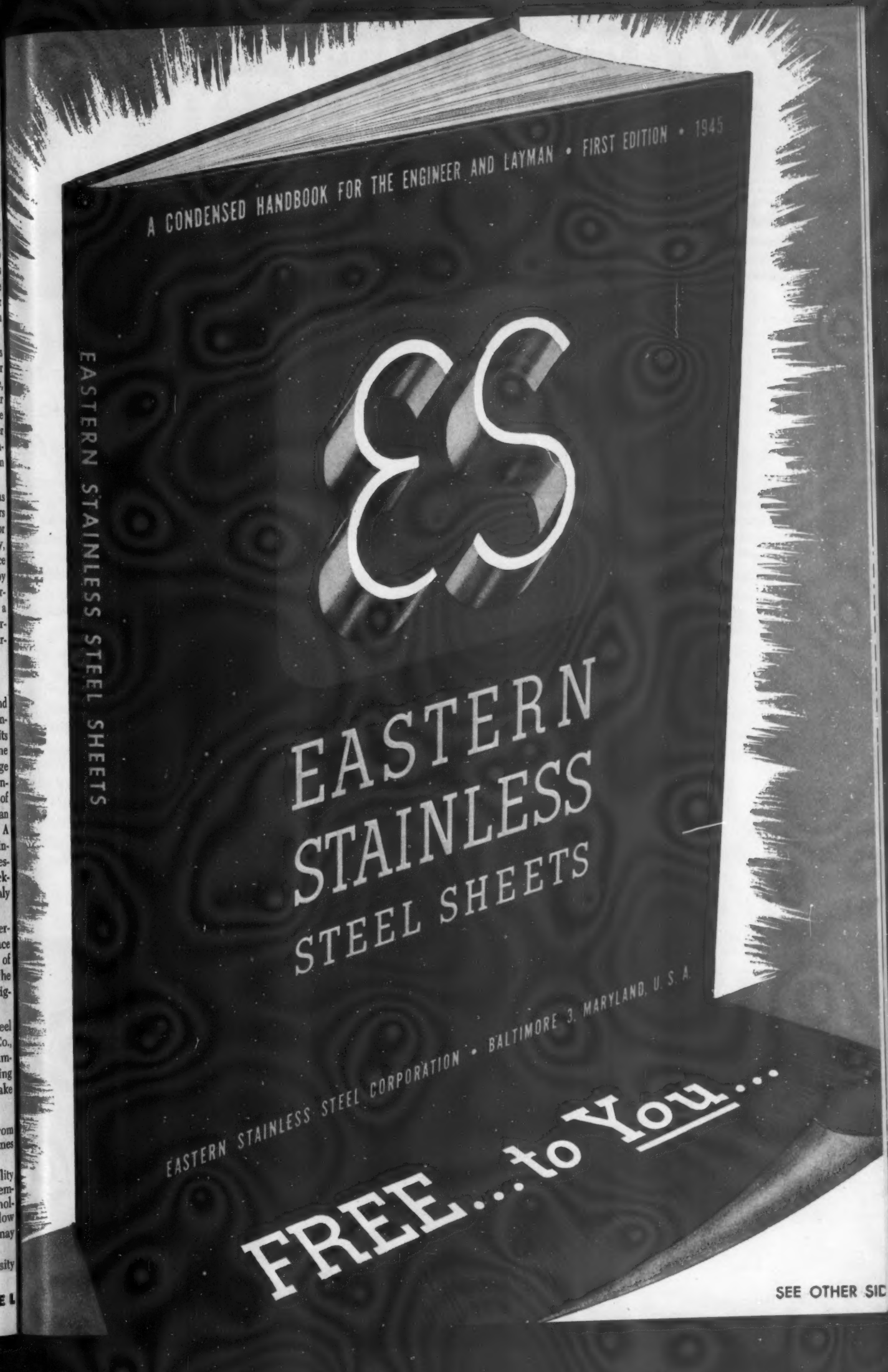
After approximately 10 months in service or about 19,000 to 20,000 furnace switching operations, the performance of this air-blast interrupter switch leads the operators to believe it represents a significant advancement in this art.

Newell Hamilton, superintendent steel plant, Babcock & Wilcox Tube Co., Beaver Falls, Pa., in discussing "Seamless Tube Piercing" stressed the following properties of tube steel in order to make a defect-free seamless tube:

1. A dense outer surface free from any longitudinal defects or radial planes of weakness.

2. Good high temperature ductility over a sufficiently broad range of temperature to permit the piercing of hollows of commercial length and to allow for any temperature buildup which may occur as a result of the deformation.

3. Free from pipe or center porosity


A CONDENSED HANDBOOK FOR THE ENGINEER AND LAYMAN • FIRST EDITION • 1945
EASTERN STAINLESS STEEL SHEETS
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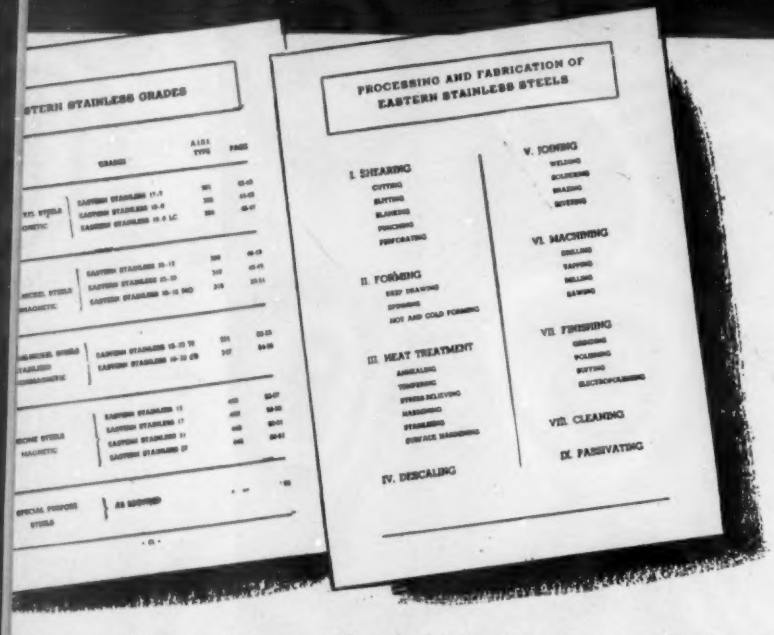
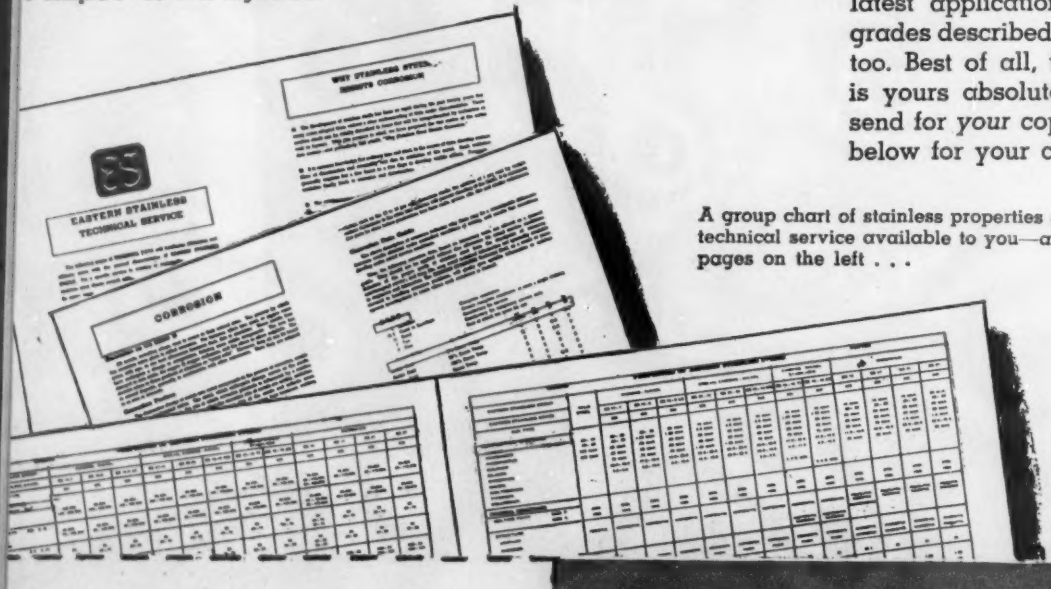
EASTERN STAINLESS STEEL CORPORATION • BALTIMORE 3, MARYLAND, U. S. A.
FREE...to You...
SEE OTHER SIC

NOW— THE NEW HANDBOO
BY EASTERN STAINLESS STEEI



These two sub-indices give you an idea of what it will be worth to you to have this book handy on *your* desk. Have you ever seen any compilation of facts on stainless so *complete*—so *well organized*?



A group chart of stainless properties and notice of a valuable new technical service available to you—*all in one book*. A few sample pages on the left . . .

After months of preparation it's now ready — this valuable 96 page Catalog you've been waiting for!

There's not a page that's not *authentic* in EASTERN's handy new "encyclopedia" on Stainless Steels. And no wonder—the book was actually compiled by top stainless steel specialists . . . EASTERN key men who know not only their own jobs but a good many of your problems too. You'll find they've anticipated your questions and arranged the answers so when you want one you don't have to thumb for it!

But there's more to this book than basic facts. So skillful is the condensation on its 96 pages that you get everything of importance—with the latest applications of various Stainless Steel grades described in detail! Profusely illustrated too. Best of all, this valuable new hand book is yours absolutely without charge. Why not send for *your* copy today? A coupon is placed below for your convenience in writing.

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when **STAINLESS** *is the question*

EASTERN STAINLESS STEEL CORP., BALTIMORE 3,

There's a WRIGHT WAY to handle materials

In handling materials, a lot of money can be wasted—or saved. The **WRIGHT** way *saves.*

In the Wright line there is a hoist for every job. Wright Improved High Speed Hoist, Wright Screw Hoist, Wright Differential Hoist, Wright Speedway Electric, Wright Trolleys, Wright Jib and Traveling Cranes—every one of them designed and built to do your specific job, safely, rapidly, economically. Safety is the *first* in-built quality of any machine that bears the name **WRIGHT.** They are designed for speed and efficiency; built for rugged durability.

See your **WRIGHT** distributor. You'll find him listed in your metropolitan classified telephone book. If your problem is special, ask your distributor to call a **WRIGHT** engineer, who has had years of experience in solving material-handling problems.

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FLYING OVER THE WRIGHT HOIST PLANT

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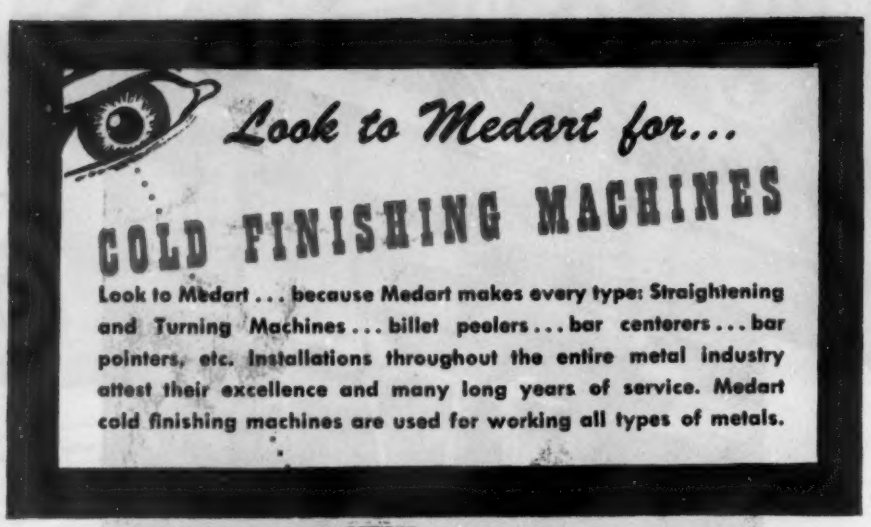
WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE

ACCO TRADE MARK

In Business for Your Safety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COLD FINISHING MACHINES
Look to Medart . . . because Medart makes every type: Straightening and Turning Machines . . . billet peelers . . . bar centerers . . . bar pointers, etc. Installations throughout the entire metal industry attest their excellence and many long years of service. Medart cold finishing machines are used for working all types of metals.

NO. 4 SIZE MEDART TYPE HF BILLET PEELER
NO. 3 SIZE TYPE LS HEXAGON, FLAT AND SQUARE STRAIGHTENING MACHINE
NO. 4 SIZE MEDART CENTERLESS AUTOMATIC BAR POINTER
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MANUFACTURING ENGINEERS OF COMPLETE TRANSMISSION EQUIPMENT AND SPECIALIZED MACHINERY

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THE MEDART COMPANY • 3500 DE KALB ST., ST. LOUIS, MO.

or any internal defect near the center of the billet that may open up on the inside of the bar in the process.

The foregoing properties must be superimposed upon any other metallurgical, chemical, or physical properties dictated by the use for which the tubular product is designed. In some instances, particularly in the high-alloy steels of the stainless type, it has been found necessary to balance the alloy constituents in an effort to stabilize the phase of the alloy and effect improvement in high temperature ductility.

The general features of electric furnace melt procedure that contribute to the production of quality alloy steel are mainly concerned with thorough degassification of the melt. This is particularly true of the low-carbon alloys that contain substantial amounts of chromium. The most effective means of degassification has been found to be a good carbon boil near the end of the oxidizing period just before slag off. Care must also be exercised in the formation of finishing slags which require substantial amounts of reducing agents such as silicon, carbon, or aluminum. Good ingot surfaces require care in mold preparation and pouring practice.

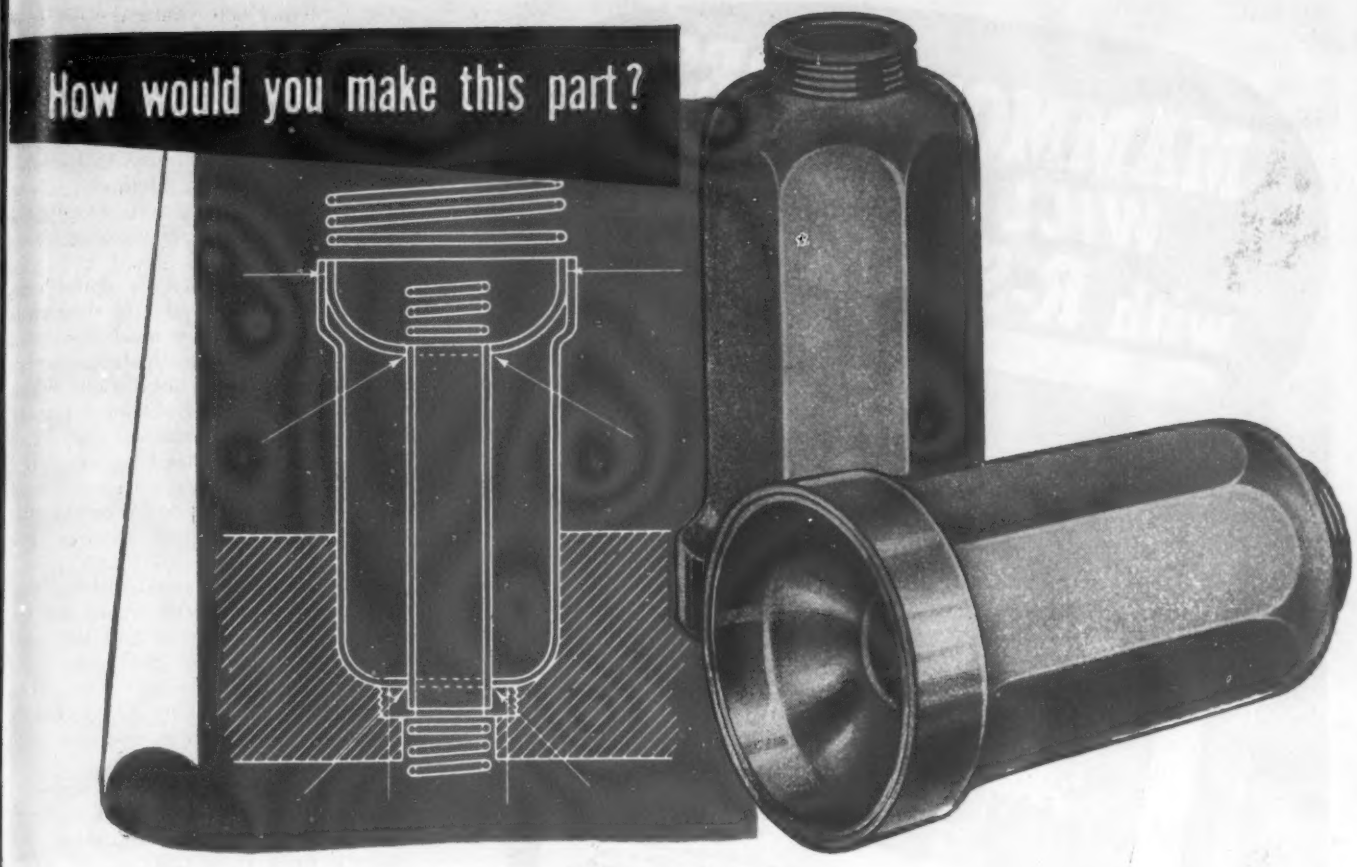
Bloom conditioning on all analyses containing less than 4 per cent chromium is done by torch scarfing. All analyses in this group containing more than 0.20 per cent carbon or 0.65 per cent molybdenum are preheated to from 400 to 600° F for this operation, while those under this analysis are scarfed cold. The entire surface of each bloom is treated in this manner, and the scarfing torch is used as a means of exploring and detecting defects in the bloom as well as a means for removing them. All analyses containing more than 4 per cent chromium are ground, and here again the entire surface of each bloom is inspected after a preliminary skinning operation and then re-ground before final inspection. Mr. Long mentioned that the importance of a defect-free bloom surface cannot be overemphasized in the production of tube steel. The investment in conditioning hours at this stage of the process is well repaid by a decrease in rejections at later stages in the production of a tube.

NEXT YEAR'S AISE MEETINGS

Spring Conference: Chicago, May 6-7.
Fall Convention: Cleveland, Oct. 1-3.

Experiences indicate that round or billet conditioning can be overemphasized and is not nearly as effective a means for producing defect-free tube billets as bloom conditioning. Manhours of conditioning time in this portion of the plant have been reduced greatly in the course of operations with an actual improvement in seam rejections in the tube mill.

Slow cooling of semifinished steel pre-



Lepel Induction Heating makes "child's play" of many tough jobs

Here's another example of the manner in which Lepel Induction heating simplifies and speeds difficult assembly jobs.

The assembly consists of two steel stampings, a section of seamless tubing and a part machined from brass bar stock.

Surfaces to be joined are pre-fluxed and the parts assembled in a jig with the brazing alloy or solder preplaced in the form of rings. Heat is applied simultaneously to all joints, indicated by arrows on blueprint, by means of special load coils of the Lepel Induction Heating Unit. The operation requires but a few seconds and production can be further accelerated by set-ups which make it possible to braze or solder several units while others are being assembled.

As the heat is generated *within the metal itself*, the brazing alloy or solder penetrates throughout the joint, insuring uniform soundness and strength with minimum use of brazing alloy.

Excessive heating is impossible because time and temperature cycles are automatically controlled. There is no scaling; discoloration is minimized; finishing requirements are negligible.

Metals of any analysis — ferrous or non-ferrous — and in any form, can be joined by Lepel Induction Heating, using brazing alloys of any melting point. No special operating skill is required, yet production is speeded and costs are cut.

The same compact, relatively-inexpensive unit can be used without alteration for localized hardening, normalizing, annealing, stress relieving or melting.

Why not permit a Lepel field engineer to check your production for possible economies by this modern heating method. Just write

Lepel High Frequency INDUCTION HEATING UNITS

LEPEL HIGH FREQUENCY LABORATORIES, INC.

PIONEERS IN INDUCTION HEATING

***General Offices:* 39 West 60th Street, New York 23, N. Y.**

DO IT FASTER, BETTER, MORE ECONOMICALLY BY LEPEL INDUCTION HEATING

The largest die forging press in the world, recently announced by Wyman-Gordon Products Corporation, "will make available larger magnesium and high strength aluminum alloy forgings than any yet made."

Wyman-Gordon Products Corporation selected these types of R-S Furnaces for the heat-treatment of work to be turned out by this press.

3 R-S Continuous Convection Type Forging Furnaces

1 R-S Convection Type Heat-Treating and Aging Furnace

This is another instance of selection due to R-S high-quality construction coupled with R-S designing ingenuity and dependable performance.

R-S Furnaces of Distinction

FURNACE DIVISION
R-S PRODUCTS CORPORATION

122 Berkley Street • Philadelphia 44, Pa.

vents flaking which can be defined as tiny fissures in the body of the steel. This was brought out by J. W. Barker, staff consultant, Loftus Engineering Corp., Pittsburgh who as co-author with E. R. Cole, engineer, industrial furnace division of Loftus, spoke on "An Examination of Slow Cooling Methods". Slow cooling, the speaker stated, gives good results in machining and shearing qualities.

Mr. Barker expressed no doubt concerning the practical value of slow cooling, but he said there is much discussion on the efficiency of methods employed. He described several installations which are being employed to obtain uniformity and in conclusion mentioned that in all the cases material handling is a real problem necessitating special equipment and giving rise to the desire on the part of steelmakers to install car-type furnaces.

Reserves of high-grade coking coal with low-sulphur concentrations are becoming rapidly depleted and the steel industry is faced with the problem of operation on high-sulphur coals. This warning was sounded by W. A. Leech, Jr., Koppers Co., who as co-author with F. D. Schreiber, Pittsburgh Coke & Chemical Co., Pittsburgh, presented a paper on "The Manufacture of By-Product Sulphuric Acid from Hydrogen Sulphide in Coke Oven Gas."

Part of this problem, he announced, so far as it is reflected by high hydrogen-sulphide concentrations in coke-oven gas, may be solved by gas purification. For this purpose we believe the process best fitting the by-product coke-oven plant serving a steel mill is one which will not only purify the gas as much as necessary for mill purposes but also recover the sulphur as sulphuric acid for use in the plant and mill together with any other useful by-products which may be sold at a profit.

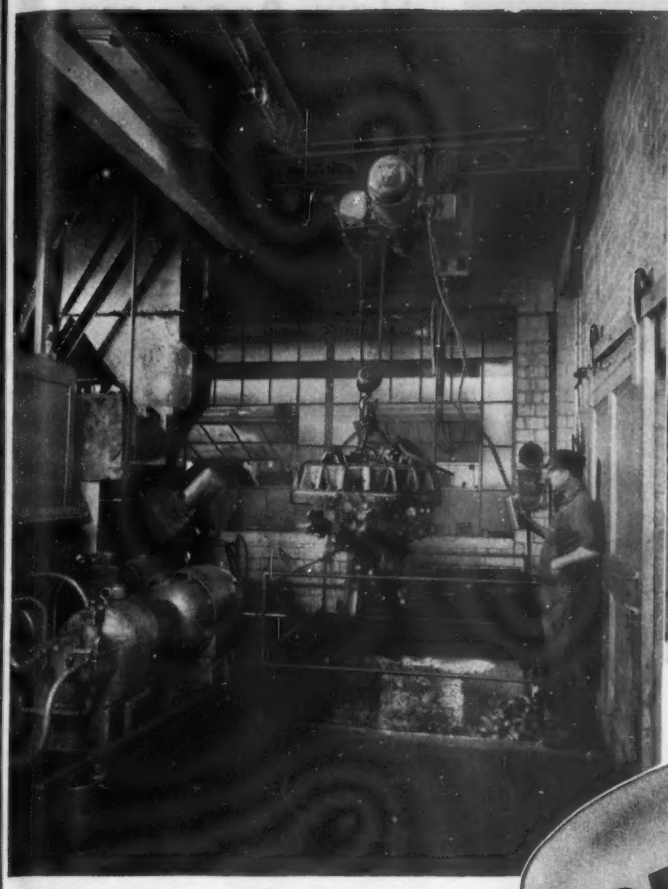
The total efficiency of removal and recovery which may be obtained from a plant designed with our present experience will be 95 per cent hydrogen-sulphide removal from the gas multiplied by 96 per cent conversion to sulphuric acid, giving an overall conversion efficiency of 91 per cent from sulphur in the gas as hydrogen sulphide to sulphur in the finished concentrated sulphuric acid.

In most cases, with a hydrogen-sulphide concentration of 450 grains per 100 cu ft in the raw gas, and with power and water at usual steel plant costs, the manufacture of sulphuric acid will be a profitable undertaking.

Both the sulphur-recovery and the contact-acid plants can be successfully operated with no more than normal difficulty for the usual by-product plant equipment.

—o—

A recent survey by the Pressed Metal Institute reveals that use of alloy steels by its members has increased up to 500 per cent since 1941. A high percentage of members contacted stated their intentions to greatly increase use of alloy steels over amounts used during the war years.



BRIQUETTES Handled Fast and Easily with MAGNET CRANE

Above left: Approximately 10 tons of briquettes are removed daily from the pit with this easy rolling hand-propelled Cleveland Tramrail crane and magnet. Push buttons control the electric hoist and magnet.

Above right: The briquettes are unloaded in storage bins under the long crane runway or directly into trucks at the rear of the building.

With its many metal-working machines operating at top speed in the manufacture of Monarch precision lathes, the disposal of chips and shavings became a serious problem at The Monarch Machine Tool Co., Sidney, Ohio.

The situation was remedied by the installation of a briquette-making machine and a 3-ton Cleveland Tramrail Crane with electromagnet for removing the briquettes to storage bins or trucks for shipment.

The briquettes are made quickly. 16 are turned our per minute from steel scrap and 20 from cast iron. In this compact form the scrap requires little space, is easy to handle and commands a higher selling price which in a reasonable time will pay the cost of the entire installation.

From the machine the briquettes roll into a pit from which they are removed by the magnet crane. A 4-button pendant station on the crane controls all operations. A "raise" and a "lower" button operates the electric hoist, and an "on" and an "off" button controls the magnet.

The magnet crane installation eliminates all lifting and shoveling or other hand labor. The magnet not only picks up all briquettes but also all odd and end chips and shavings that accumulate in the pit.

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THE CLEVELAND CRANE & ENGINEERING CO.
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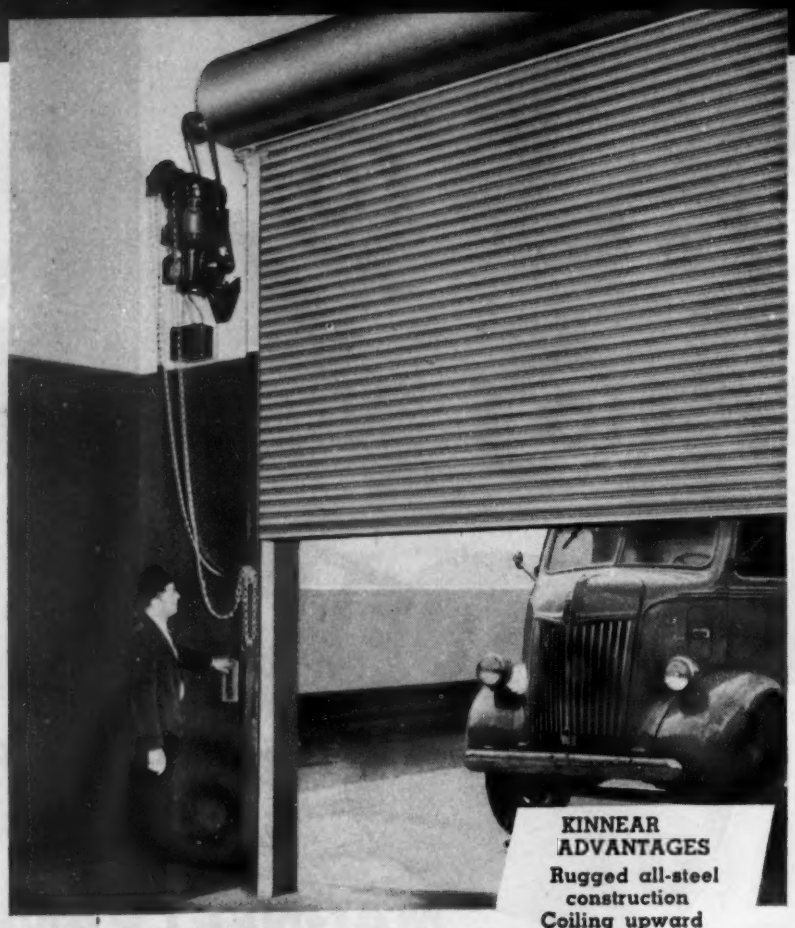

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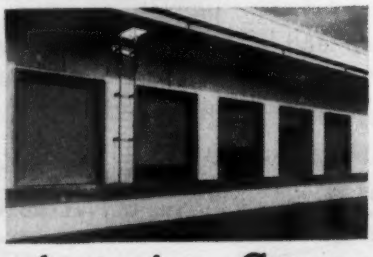

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Iridite Finish—Iridite Galvon, offering resistance to white corrosion of galvanized products, is applied to complete assemblies, parts, or to galvanized sheet previous to fabrication by dipping at normal room temperatures. Process does not require special equipment or electric current. Basic coating takes various dye colors. Rheem Research Products Inc., Baltimore, Md. ST392

—o—

Protective Coating — Designed to prevent corrosion in spite of long storage and exposure to elements, a removable protective "skin" for metal parts is impervious to penetration of air, oil, organic solvents such as gasoline, benzine, kerosene, etc. Suitably treated coating becomes nonremeltable and insoluble in water. Thomas W. Dunn Co., 546 Greenwich street, New York 13. ST357

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Face Shields — Four types, F-100, F-200, F-300, and F-400, provide light-duty protection on operations such as metal sawing, acid handling, buffing, sanding and light grinding. Also three types of button-on windows for shields: clear cellulose acetate for general purposes; 24-mesh screen for heat protection; and fibre with filter glass window for welding and scarfing. American Optical Co., Southbridge, Mass. ST390

—o—

Protective Creams—Clad wet and dry protective creams for processing X-ray films prevent finger marks during development of negatives. Dry type, used while handling film, leaves no stain, and wet type, being unaffected by processing chemicals, is satisfactory for use in dark room. It leaves no stain on films and reduces processing stains on operators' hands. B. F. Goodrich Co., Akron, O. ST395

—o—

Mold Coating—Liquid combining lubricating and rust inhibiting qualities and preventing sticking, Moldeze, is sprayed or brushed onto mold, giving it a semi-permanent surface. Protective Coatings Inc., Box 56, Detroit 27. ST 351

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Acid Inhibitor—An organic acid pickling inhibitor in powdered form, Pennsalt PM-40, is highly stable and completely soluble in pickling baths of either muriatic or sulphuric acid. Contains 100 per cent active ingredients and is effective at concentrations as low as 0.02 to 0.10 per cent by weight of pickling bath and may be used in acid pickle baths prior to electroplating, galvanizing and enameling. Special Chemicals Division, Pennsylvania Salt Mfg. Co., Philadelphia 7. ST387

SIMPLEX

A troublesome operation is the boring and turning of concentric cylindrical surfaces on bulky objects, rear axle housings, landing gear parts, etc. Equipment that will perform several operations at one setting of the work reduce these to their simplest form and provide low-cost production with high quality.

SIMPLEX 2U 2-way Precision Boring Machine with #4 spindles and extended bed center section mounting a fixture designed to handle varying lengths of work units, resulted in high production rates for moderate quantities, greater convenience for the operator, and a uniformly high standard of quality.

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SIMPLEX Machine Tools Division

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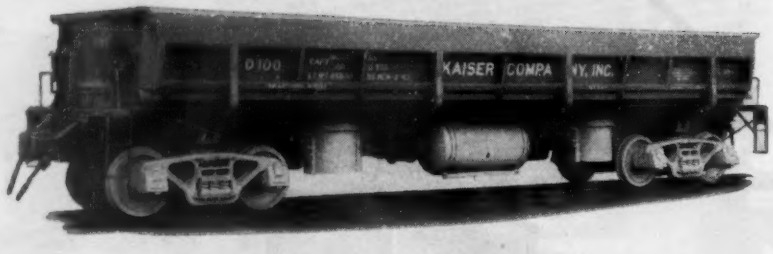

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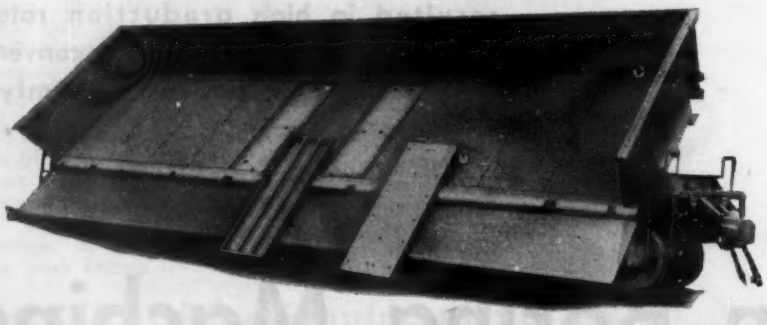
HANDLING HOT LOADS

Here is a Rolling Trunnion Air Dump Car with a sectional floor designed to take the place of the ordinary single plate floor where hot loads are handled. The lower floor plate extends over the entire sub-frame of body in the same manner as in single floor plate construction. Superimposed on this lower plate is an additional plate in sections having small I-beams riveted or welded to the under side to serve as spacers or separators between the top and bottom plates. Such an arrangement of floor not only provides for air circulation and greater radiation surface, but facilitates repairs in case of damage because the floor sections are easily removed, repaired and replaced.



Do you have our descriptive bulletin 72-C?

PRESSED STEEL CAR COMPANY, INC.
INDUSTRIAL DIVISION
PITTSBURGH, PA.

Slag Solubility Improved By Fluorspar Additions

An article on "Improvement of the Citric-Acid Solubility of Basic Open-Hearth Slags Containing Fluorspar" by T. F. Pearson, Colvilles Ltd., Clydebridge Steelworks, England, published by Iron and Steel Institute of Great Britain, covers a survey of the order of solubility for slags from both fixed and tilting furnaces when fluorspar is used. Tapping-slags were found to be 10 to 20 per cent soluble for fixed furnaces and 20 to 30 per cent soluble for a tilting furnace with current practice. Powdered low-solubility slags with sodium carbonate proved to be effective, and by use of a sufficient quantity, any slag could be rendered completely soluble. Efficiency of the sodium carbonate became less as the initial solubility of the slag with which it was sintered increased.

Results obtained from the sintering experiments prompted full-scale trials in the pitside, and numerous treatments were carried out by feeding sodium carbonate and mixtures of sodium carbonate with sand into slag ladles at tapping. Results suggest that the efficacy of the sodium carbonate depends on its more complete dissociation at high temperatures than the other sodium compounds used. Laboratory experiments disprove the possibility of the formation of sodium phosphate up to the limit of sodium carbonate used, as no "water solubility" resulted from any treatment.

Additions of sand made in the full-scale trials appeared to have some slight effect in increasing the solubility, probably by increasing the tendency towards the formation of some soluble silico-phosphate. Full-scale trials indicated that, in order to keep down the proportion of sodium carbonate to reasonable amounts, the addition of fluorspar to the furnace would have to be limited to approximately 400 lb for an 85-ton charge.

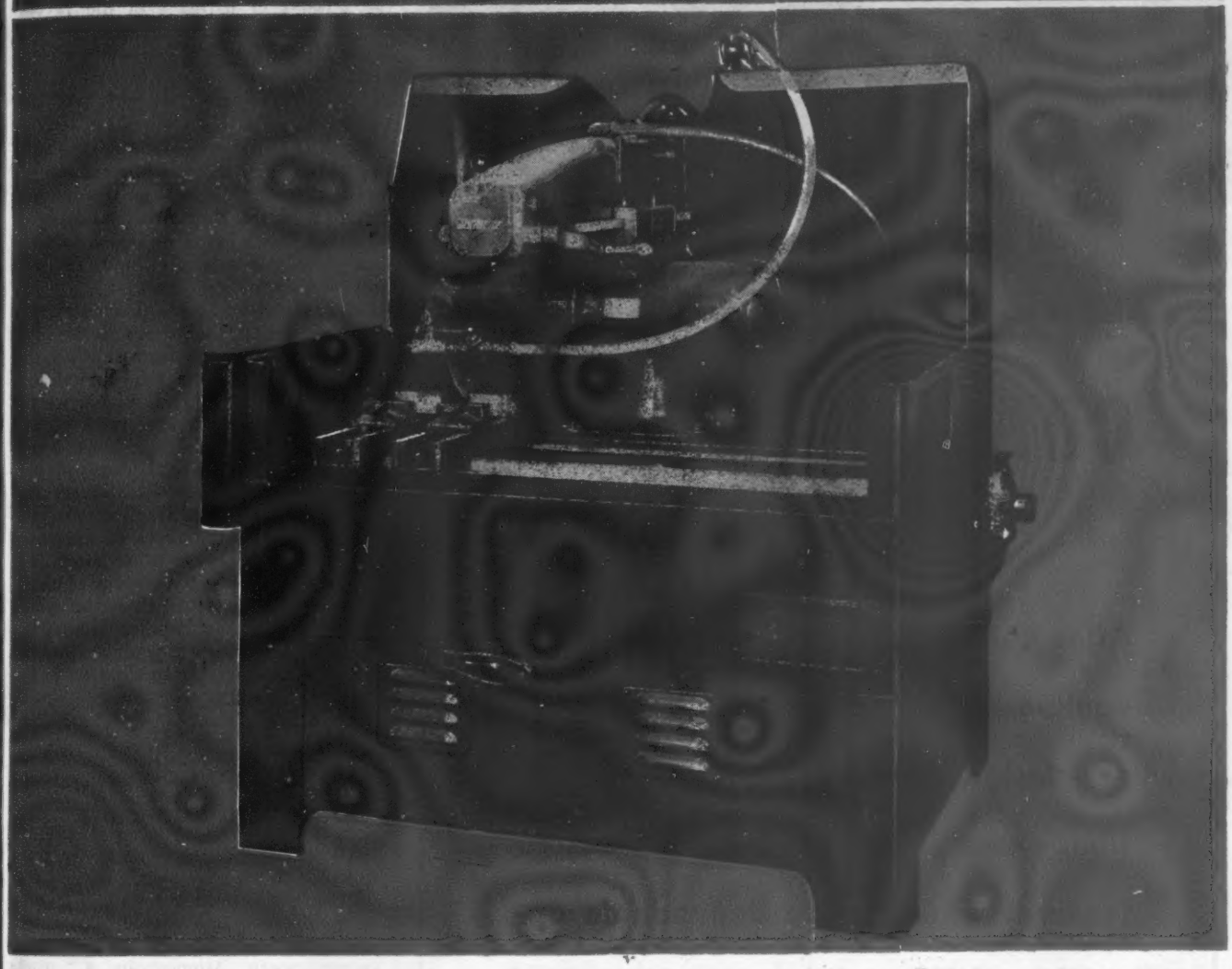
Safety Code on Industrial Use of X-Rays Completed

A safety code for industrial use of X-rays has been completed by American Standards Association. Intended to protect workers from tissue damage that can lead to lifetime disability and death from this cause, the interim standard will form the basis for a permanent peacetime standard still to be developed.

X-ray that penetrates a steel casting for an engine or the newly welded plate of a ship, detecting flaws through as much as 12 in. of steel, also penetrates the tissues of the operator. Immediate effects can be felt little, if at all, and there is no warning heat or pain. When effects become apparent, they appear gradually and often a long time after exposure.

Overexposure to X-rays results in tissue breakdown, damage to vital organs which are more radiosensitive than others, and changes in blood composition. Loss of reproductive ability is an effect

DE WALT offers cut-off power to spare!



The new DeWalt "Wet-Cut" Metal Cutting Machine:

- **cuts wet with coolant or dry if desired**
- **cuts off wide stock and odd shapes**
- **also cuts metals on an angle**

Power is the keynote of the new DeWalt "Wet-Cut" Heavy-Duty Metal Cutting Machine. Its 15 H. P. DeWalt-built motor, driving an 18" diameter abrasive wheel or steel saw blade, makes it possible to "walk" through the toughest kind of metal. It is this same power that keeps abrasive wheels operating at a constant speed, thus increasing wheel life and accuracy of cut. It is power like this that saves time and lowers cutting cost.

If you have a heavy-duty metal cutting job to do, investigate this DeWalt. Write for full information.

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Atlas coal charging cars are preferred equipment on most ovens because they are designed to suit operating conditions exactly, and include those design features which insure dependable operation with low maintenance.

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which even may appear in the operator's offspring.

X-ray hazards, arising out of the characteristics which make X-rays so valuable as an aid to medical science, can be controlled by adequate safeguards and by limiting exposure. Early in the study of the effects of X-rays it was found that prolonged exposure produced certain destruction on human tissue. Degree to which these effects are produced depends upon the part of the body exposed, time of exposure, and on the softness or hardness of the rays—that is, their relative penetrating ability. These factors vary with variations of voltage, of the source of excitation, the distance from the X-ray tube, and the protective barriers provided.

In setting the maximum dosage that can be borne by the operator without injury, the ASA committee used the limits set by the Bureau of Standards in 1936, but it also has taken into consideration periods of exposure, kinds of rays, and other operating factors.

In X-ray work, various construction materials can be used to absorb the rays, thus preventing them from injuring the operator. Lead is the most practicable metal because of its high atomic weight and consequent high absorptive ability, as well as its adaptability to construction requirements. Concrete, barium, plaster, earth, and other materials also are frequenty used. In arriving at practical classifications of the types of apparatus for which protection is required, the committee worked out a number of classifications running from those in which the total protection installed around the source is sufficient to reduce the exposure to the maximum permitted in the code, to others that are subject to certain restrictions in use.

Measurement Course Available to Inspectors

A correspondence course entitled "Science of Measurement," designed to aid industry in cutting costs and increasing production, is available from Continental Machines Inc., 1301 Washington avenue South, Minneapolis 4. Eight lessons include the following subjects: Progress in Precision, Inspection and Care of Gage Blocks, Uses of Gage Blocks, Accessories of Precision, Sine Bar and Its Uses, Measuring to a Millionth with Optical Flats, DoAll Comparator and Threads and Gears, and Mobile Inspection Unit and How to Set Up a System.

Lessons illustrate care and use of gage blocks, with examples and photographs showing how use may be expanded. Photographs also show inspection and engineering methods utilizing height gages, locating gages, go-no-go gages, inside and outside micrometers, lead screw measuring gages, scribers, dividers, and mobile inspection unit. Tables and formulas simplify such problems as measuring pitch diameter of screws, splines, and helical gears by the three wire method, and measuring of angles, bevels and tapers by use of the sine bar.

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AUTOMETRIC BORING MACHINE

Advanced in every detail of operation and construction, this new machine is a real contribution to the art of precision boring. It offers initial high accuracy — design and construction to sustain this initial high accuracy throughout a long life — unexcelled simplicity, ease and convenience of operation.

Developed by Kearney & Trecker engineers to provide a superior, faster method of precision boring, the Model C Autometric embodies these "shop-tested" features:

- Column, bed and chip guard cast in one compact, sturdy unit — integral design.
- Rugged, compact, balanced construction with exceptionally low center of gravity — minimum vibration.
- Hardened, ground and lapped quill, saddle and table ways — for sustained accuracy.
- Large diameter quill with extra long bearing, sliding in a fixed headstock provides the total range of vertical movement — fewer moving parts.
- Rapid traverse to spindle quill is instantly available — speed and ease of operation.
- Direct measuring by Precision Screw Locating results in faster operation with no loose pieces to handle.
- Multiple V-belt drive direct to spindle at all speeds — smoother operation.
- Greater Speed Range — infinitely adjustable spindle speeds from 50 to 2500 rpm.
- Greater Feed Range — 8 boring feeds .0005 inch to .0148 inch per revolution of spindle.

In addition to these design features the Model C Milwaukee Autometric is unusually simple in operation; even an unskilled operator will quickly become familiar with this machine. An added feature is its cleanliness in operation — chip disposal being provided through the base of the machine.

The Model C Milwaukee Autometric will reduce your precision boring costs — get complete information — write for Catalog No. CMA10.

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PAGE STEEL AND WIRE DIVISION
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Modern Metal Protection

(*Continued from Page* 120)

for lining equipment for handling corrosives. In general, the types of lining may be divided into two groups, namely, synthetic rubber linings such as GRS[1], GRA[2], GRM[3], and GRI[4], and thermoplastic linings.

Since Nov. 1, 1943, the linings used in tanks, pipe, drums, etc., have been limited to general purpose synthetic rubber of which 95 per cent or more has been GRS, and the small balance GRM and GRI. In the linings now used, 10 per cent natural crude rubber by volume is permitted and, for tank cars which must meet I.C.C. specifications, 35 per cent is allowed. Out of the 10 per cent crude rubber by volume must also come the rubber that is needed for repairing existing rubber lined equipment, and for the necessary bonding cements.

Certain synthetic rubber linings have been developed that discolor chemicals less than did natural crude rubber materials. An outstanding example is the handling of the various bright-nickel plating solutions. One of the first compounds developed out of synthetic rubber proved to be capable of handling nearly every bright-nickel plating solution without any contamination of the bath and without detrimental effect on the nickel plate itself.

Hard GRS for Muriatic Acid

The largest volume of rubber lined equipment is sold for handling muriatic acid. Many people using rubber lined equipment were of the opinion that GRS general purpose synthetic rubber would not prove satisfactory for this acid. In general this is true as far as soft compounds of GRS are concerned, but GRS can be made in flexible, hard, and ebonite types, and the resistance of such grades to muriatic acid is comparable to natural crude rubber of similar hardnesses.

Before the war, much equipment for handling muriatic acid was lined with soft natural rubber compounds. Soft natural rubber is also attacked by muriatic acid, but, as it is attacked, a hard film forms on the surface of the natural soft rubber, and this hard surface in turn tends to prevent further penetration of the acid. In the case of soft GRS stocks, this hard surface is not formed, hence the muriatic acid slowly penetrates the entire lining.

It is for that reason that the majority of linings supplied today for muriatic acid are of a flexible hard GRS compound. Weak solutions of sulphuric acid as used for pickling or cleaning before electroplating, offer no particular problem as even soft GRS grades handle it satisfactorily.

When natural crude rubber again becomes available, it will again be the most prevalently used lining because it is easier to handle and install than lining made from synthetics. It requires considerably more time to install the synthetic materials in view of the fact that the synthetic

SCULLY-JONES

Style A

TAP CHUCKS

In a standard spindle with a Morse Taper Hole

In Scully Jones Floating Holder

In Floating Tension Type Tap Driver for Magic Chuck

In a Magic Quick Change Chuck

In a Spring Compression Tap Driver

Universally used for individual or modern mass production, the Scully-Jones Style "A" tap chuck is a one-piece tool designed for driving taps in any type of machine having a spindle, holder or attachment with a Morse taper hole.

True-running, definite stop, positive drive, smaller in diameter than spindle, quick insertion and easy ejection, are advantages that reduce tap breakage and speed up production.

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1. Drives By Square—a positive drive
2. Centers By Shank—for correct alignment
3. Collet Action—locks tap in chuck
4. Taper Shank—fits any M.T. hole
5. Four Point Bearing—gives collet action

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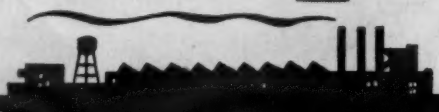

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These are the things your handling system should have for efficient production. Lifting loads, carrying them *anywhere* in the plant or yards, placing them exactly where you want them—that's what Mobilcranes and Supercranes can do for you—and they do it economically too . . . thanks to one man operation, one engine power and pneumatic tires.

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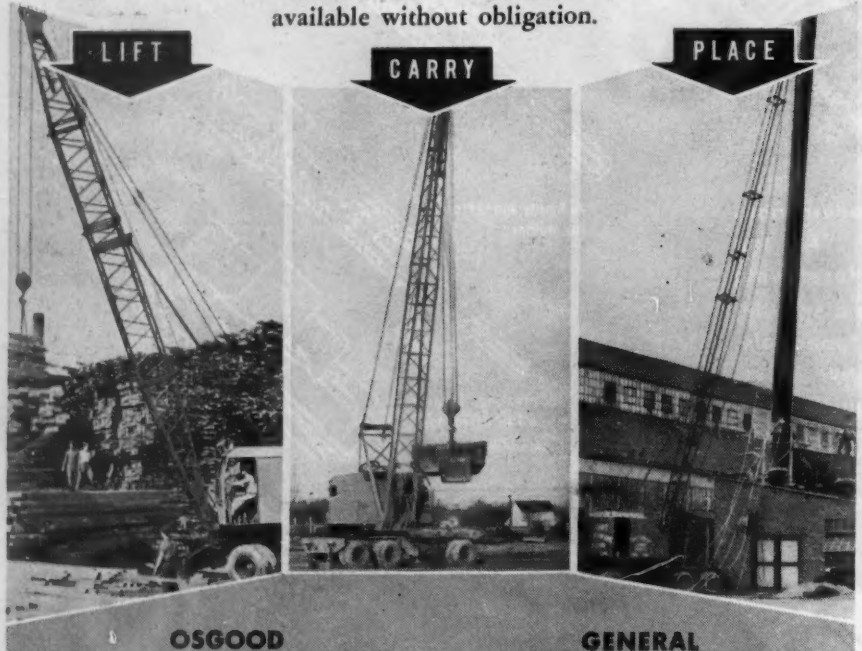

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Fast • Safe • Maneuverable
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THE OSGOOD CO. MOBILCRANES — THE GENERAL EXCAVATOR CO. SUPERCRANES

MARION, OHIO

rubbers lack natural building tack and often require pre-shrinking before they are applied to the vessel to be lined.

Thermoplastic linings are applied directly to the steel walls of the containers by using proper adhesives and vulcanization of the lining after it has been adhered to the container is not required. Before the war these materials were strictly special purpose linings and were only used where rubber linings would not handle the corrosives involved such as oxidizing acid solutions, for example, nitric and chromic.

When the first Rubber Orders were written, it was ruled that neither natural crude rubber nor synthetic rubber could be used in connection with plating or anodizing equipment. Fortunately, thermoplastic materials were permitted. Cost of these linings is higher than natural crude rubber or general purpose synthetic rubber linings, but there are a number of successful installations, especially in electroplating. Principal advantages of Koroseal in electroplating tanks are the ease in making field repairs and its extremely low absorption of plating solutions. A disadvantage is that maximum temperature for which it can be recommended is 150°F.

[1]Buna S type. Butadiene Styrene Copolymer (not oil resisting).
[2]Buna N type. Butadiene Acrylonitrile Copolymer (oil resisting).
[3]Neoprene type. Chloroprene Polymer.
[4]Butyl type. Isobutylene Polymer.

Electrostatic Dipping And Spraying

By HAROLD RANSBURG
Harper J. Ransburg Co.
Indianapolis, Ind.

ELECTROSTATIC detearing and electrostatic spraying are two new methods of applying finishing materials which are successfully being used in several fields and hold promise of wide application.

In operation of the electrostatic process, article to be coated is passed through an electric field created by 85,000 to 100,000 volts of pulsating dc at 10 milliamps or less. The electrodes are fine wires of small surface area in comparison with the article to be coated. With this principle reversed and a heavy grid as the electrode and the voltage reduced to 80 kv, the equipment serves as a detearing device for paint-dipping operations to attract from a dipped piece the "fatty edges" which form at the drain-off points.

In spraying, fixed guns are used having special tips developed for the required pressure operation. In general, the article to be coated is passed on a conveyor line, which grounds it, through the electric field. A charge is imparted to the sprayed particles of the coating, causing them to be attracted to, and deposited on, the article with minimum loss of paint or lacquer. In practice, the piece being coated usually is rotated to insure uniform coating, although paint is drawn to all sides simultaneously.

Electrostatic Detearing. The many

"Handiest Shapers Made"

KOPPY & DE KORSE, Detroit

Hy-Draulic Shapers are popular alike with men and management in the modern, efficient, compact plant of Koppy & De Korse Tool and Die Co., Detroit, Michigan. This means much when you see the extremely precise tools and dies in process throughout the shop. Some of these are very complicated, many call for additional interchangeable parts, all require great skill, care and patience for successful completion. That is why the "handy" features of Hy-Draulic Shapers get special mention here. It is so easy to set up work on Hy-Draulic Shapers, to select the *exact* combination of cutting speed and feed for each job, to establish stroke length and position without using tools or scarcely stopping the machine. Toolmakers are free to concentrate on details of the job in process and its prompt production. This simplifies the work of management, creates satisfied customers, builds good will and new business. Investigate the advantages of Hy-Draulic Shapers on your work. Write, today, for Bulletin 2908

4410

ROCKFORD MACHINE TOOL CO., ROCKFORD, ILLINOIS

Announcing PENNSALT PM-90

ACID CLEANING AND DESCALING COMPOUND...

VITAL USES:

1. As a pickling bath concentrate in metal finishing shops.

2. As an acid cleaner for removing water scales from feed lines, boilers and a variety of industrial equipment.

MAJOR ADVANTAGES:

1. METAL SURFACE PROTECTION: This carefully manufactured compound is known to give high protection to ferrous metal surfaces. The danger of over-pickling, pitting and high hydrogen absorption will be minimized.

2. REDUCES ACID CONSUMPTION: Compared to an uninhibited acid, Pennsalt PM-90 reduces acid consumption since the acid cleaner is consumed principally in the removal of rust and scale and not in attacking the base metal.

3. IMPROVED WORKING CONDITIONS: Acid fuming is controlled, thus contributing to better working conditions in the plant.

4. CONVENIENCE: Furnished in liquid form . . . can be used either directly from the original container or diluted as much as one part Pennsalt PM-90 to four parts of water. The dilution range will be governed by the speed of cleaning necessary as well as requirements of the particular operation.

PENNSALT PM-90 is packaged in returnable 13 gallon glass carboys containing 115 lb. net. For large consumption, Pennsalt PM-90 is also supplied in tank cars of 4,000 gallons each.

SPECIAL CHEMICALS DIVISION
PENNSYLVANIA SALT MANUFACTURING COMPANY
Dept. S-10, 1000 Widener Building, Philadelphia 7, Pa.

Kindly send me complete information on Pennsalt PM-90

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TITLE_____

COMPANY_____

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Acid, Alkali and Solvent-proof Cements · Acid, Alkali and Solvent Emulsion Type Cleaners · Paint Strippers · Pickling Agents · Rust Inhibitors

advantages of the dip method of applying liquid coatings are well known to those associated with the field of industrial finishing. Probably the most serious limitation encountered in this method has been the ever present accumulation of excess material at the drain-off points. These accumulations and "fatty edges" not only affect the finish obtainable by this method, but indirectly influence design of the oven in which they are baked. The bake is necessarily designed to meet requirements of the heaviest section of the coats. With alkyd-synthetics and oleo-resinous materials, these heavy accumulations can never be properly baked to a satisfactory hardness when they are in the presence of more uniform coatings, without over-baking the thinner films. The excess, in most cases, yields a soft, tacky or even wrinkled condition of the finish at that point.

Equally objectionable are the points of excess material when polymerizing types of finishes are used because, in this case, excessive coating produces a local brittle condition with the resultant hazard of chipping or falling off at this point. Electric detearing supplies an automatic method of freeing the piece of this excess material after the dipping operation takes place and so presents to the oven a uniformly coated piece which can be adequately baked to a uniformly satisfactory finish.

In this process, the article supported on a conveyor is dipped or flow-coated in any suitable manner. It is then carried over the usual drain board and is permitted to air dry or set sufficiently so that the flow has practically ceased. At this point the grounded article is carried over an insulated conducting grid to which a high voltage can be applied. A strongly attractive electrostatic field is thus established between the grounded piece and the high voltage grid. This force is particularly strong at points or prominences where drain-off is apt to occur. Due to this attraction, the excess paint which has collected at the drain-off points is removed from the piece and a smooth coating remains. The article can then be carried through the oven where baking can take place at a schedule more suited to the piece as a unit.

Electrostatic Spraying. There are certain items that lend themselves more readily to spraying methods. However, the usual operating procedure of coating material is wasteful and methods have constantly been sought whereby spraying efficiency could be improved. Application of electrostatic principles has resulted in improved coating technique.

In this process the article to be coated is carried past the spray position on any of the usual types of conveyors. At the spray position, insulated electrodes composed of fine copper wires are rigidly supported in a plane at a fixed distance away from the article and have a high voltage electrostatic charge applied to them. The finely atomized paint particles which are sprayed into this field from fixed guns experience a strong force

Ingalls has furnished fabricated steel to exact specifications for many important war jobs—hangars, plane factories and other plants. This is just one phase of Ingalls' broad 34-year experience in the construction and often the actual erection of fabricated steel—in factories, buildings, bridges and ships. We will welcome the opportunity to bid on your structural steel requirements. Services of experienced Ingalls engineers are also available.

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Chief among the reasons are: higher tensile strength than ordinary steel, greater toughness, ability to withstand impact, freedom from rust or tarnish, retention of strength at high temperatures, resistance to abrasion and innumerable corrosive elements.

Most likely, "Buffalo" Stainless Steel wire cloth can do a job for you, too. Don't delay the possibilities. Act now by requesting FOLDER 596 for valuable data on corrosion resistance, effects of higher temperatures, use with other metals, mesh and wire sizes.

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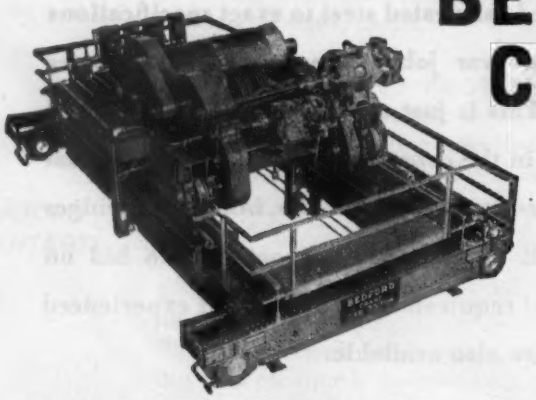

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of attraction to the piece and are deposited on it. The resulting coating is extremely uniform and, because practically all atomized particles experience this force regardless of their direction of travel from the gun, the piece is coated at very high efficiency.

The degree of savings possible is largely dependent upon the shape and size of the piece being coated. On small incidental parts, where ordinary methods are very inefficient, large savings can be expected. On large flat sheets, where hand or automatic spray is somewhat more efficient, the savings are correspondingly less.

In the Japan Co. installation in Cleveland, a saving of up to 50 per cent in paint has been experienced. The Florence Stove Co., Gardner, Mass., reports saving of a full 50 per cent in the paint bill and the reduction in number of times necessary to clean the booth from twice daily to once in 6 weeks through electrostatic operations. A similar saving in paint bill was experienced by the Walker Mfg. Co., Racine, Wis., which has found the electrostatic operation well adapted to lifting jacks despite their uneven surfaces.

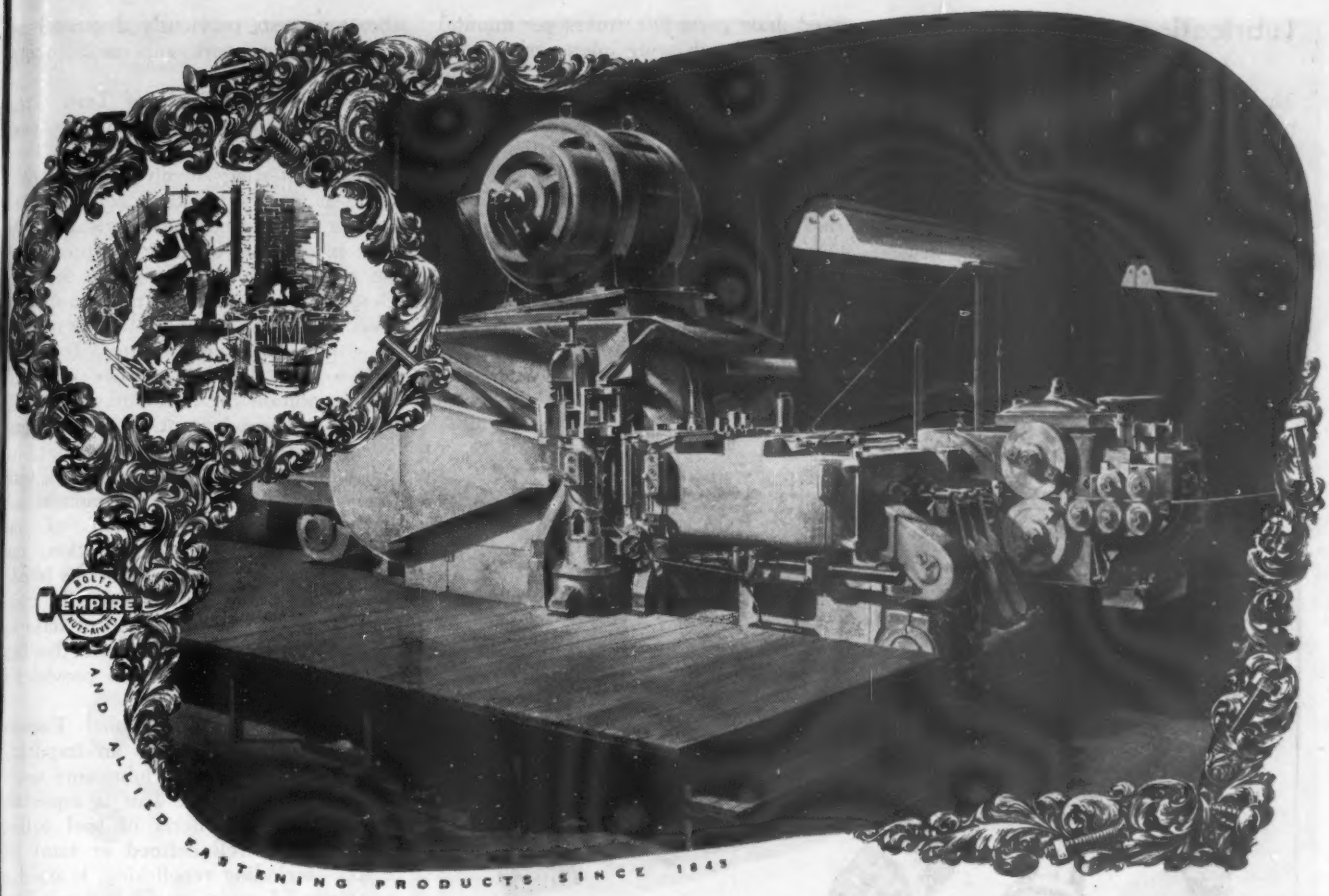
Fork-Type Lift Trucks Handle Acid Carboys

Electric fork-type lift trucks for handling large carboys of acids and cylindrical packages of chemicals in lump or powder form, manufactured by Elwell-Parker Electric Co., Cleveland, enable manufacturers to make full use of the pallet system for rapid handling and, where necessary, for high tiering in

warehouses. Four carboys in wood cases, weighing nearly half a ton, may be handled in one load. Wood frames are used to protect the necks of the carboys and to afford a support for pallets above floor level, as shown in the accompanying illustration. Dry chemicals in fiber, plastic or wood containers weighing 1 ton or more also are handled by means of pallets and fork-type trucks.

—o—

Consideration is being given to radio communication control of steam, diesel or electric yard switching locomotives serving steel plants. Expectations are that a frequency band will be assigned for this purpose.



These are the things that make America strong: enterprise, ingenuity, an eagerness to answer challenges . . . characteristics which have helped the bolt and nut business to meet the increasingly severe requirements of General Industry.

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Bolts and nuts used to be fashioned, one at a time, by mighty men — by blacksmiths. Then, almost a century ago, far-sighted Yankees instituted a new principle in bolt manufacture, embodied in the world's first automatic cold-heading machine.

The higher production and improved quality and strength of bolts turned out by the Ward Header meant that General Industry could also make important new strides in mass-producing quality products . . . and that more severe service conditions would be met with even greater fastener security.

From 1845 when RB&W shipped its bolts and nuts up the Hudson in two-masted schooners to the present when streamlined trains or high speed trucks hurry them on their way . . . developments and refinements in equipment as well as in material control and treatment have constantly helped to improve the strength, accuracy and finish of RB&W EMPIRE Bolts and Nuts . . . Today, upon its 100th anniversary, with its products being used by most of the world's leaders, with the quality of those products reflecting the importance of fasteners in the great pattern of Industry . . . RB&W pledges continuance of its traditional policy of investing heavily in research and equipment . . . so that RB&W EMPIRE will continue to stand for the *utmost* in dependability.

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Lubrication

(*Concluded from Page 134*)

The number of tests to be performed must be determined by the control that can be exercised over mechanical and other variables. For a well controlled test, two or three repeat tests might be adequate whereas under most production conditions it might be necessary to run the tests over a period of a week or several weeks and average the results. In many cases the latter procedure will result in cancellation of most of the other variables. Some representative data obtained in a high speed draw press (90 strokes per minute) in one of the drawing operations of cal. .30 steel cartridge cases are given in Table I. In this case, control over several of the variables was somewhat better than in many production shops but these data provide some idea of what to anticipate. In may be observed from the data in the table that fairly good reproducibility can frequently be obtained but occa ionally a sharp difference occurs. While it is rather discouraging when these occasional extremely erratic results are obtained, they do not obviate the value of this type of experimentation, especially when data on laboratory tests previously discussed are available to support important conclusions.

3—Comparative Type of Test. Press tests on drawing lubricants may be most adequately viewed as comparative. Consequently, testing involves comparison under as nearly identical conditions as possible of a group of lubricants. In order to compare another group, at least one member of the first group must be retested. One difficulty that constantly re-occurs in this type of testing is that the same tools cannot be used for more than a very limited number of tests. This condition also requires the use of a reference lubricant of known composition. Because of the possibility of considerable change of mechanical variables over a period of several months and the difficulty of evaluation of the severity of any specific operation, this lack of absolute values is a serious handicap. However, it can be partially compensated for by accumulation of data on laboratory devices since this can be better maintained constant and provides a more general picture.

4—Elimination of Personal Factors. Psychological factors play an important role in press testing of lubricants under production conditions. This is especially the case where criteria of tool failure are not very well defined or total life of tools including repolishing, is used as a criterion of performance. It is not feasible to discuss these factors here but serious considerations will undoubtedly lead to several methods of minimizing these factors.

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Acknowledgements

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Special appreciation is expressed to P. S. Parkinson, chief chemist of the E. G. Budd Mfg. Co., Philadelphia; Dr. R. C. Williams, chief chemist of the Ironsides Co., Columbus, O.; and V. A. Ryan, director of research of the Crown Cork & Seal Co., Baltimore; for permission to describe their methods. The description of the Crown Cork & Seal Co. modification of the Faville and Crowley Procedure, which has not previously been published, was prepared by Mr. Ryan. The Faville-Crowley Procedure is used with the permission of the Society of Automotive Engineers. The description of the Swift method is used with the permission of *The Iron Age*. Thanks are also due Dr. T. A. Reed of Frankford Arsenal for the use of photographs of force patterns in high speed drawing.

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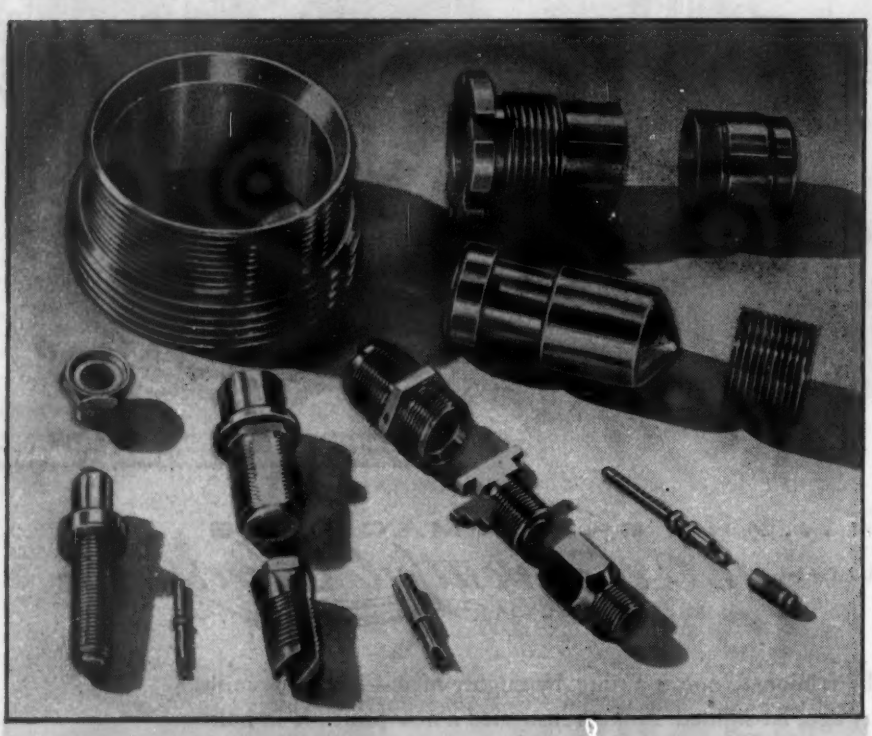
Standard Steel Works, division of Baldwin Locomotive Co., is celebrating its sesquicentennial anniversary. Standard was founded as Freedom Forge during Washington's second term in 1795.



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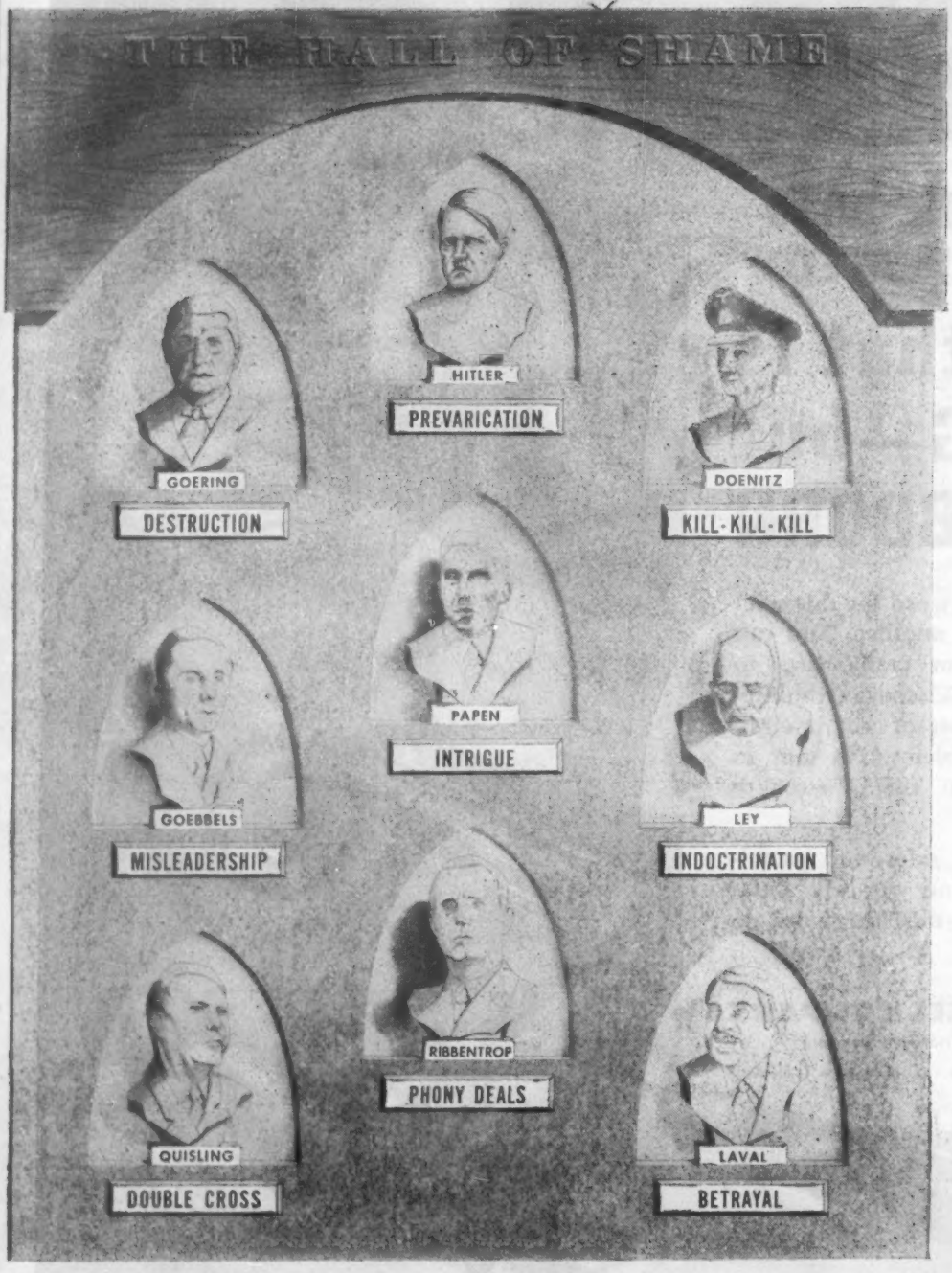
then they said to themselves

Boy!—did we build a business?



Recommended for niches in the Hall of Shame are the leaders of the House of Heil.

—All ideologists of the New Day.

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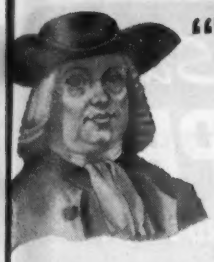
—All uttering words to dissuade men from honorable business tactics.

So their flourishing business came to the end of the road.

—recalling again the truth in the business advice of William Penn:

"False dealing travels a short road...true worth is inevitably discovered."

Timely precept, that. Many businesses will discover the true worth of techniques and equipment used in defeating the House of Heil . . . such as . . .



"True Worth is Inevitably Discovered" *he says*

LOOK, how to discover the true worth of welded design for your products:

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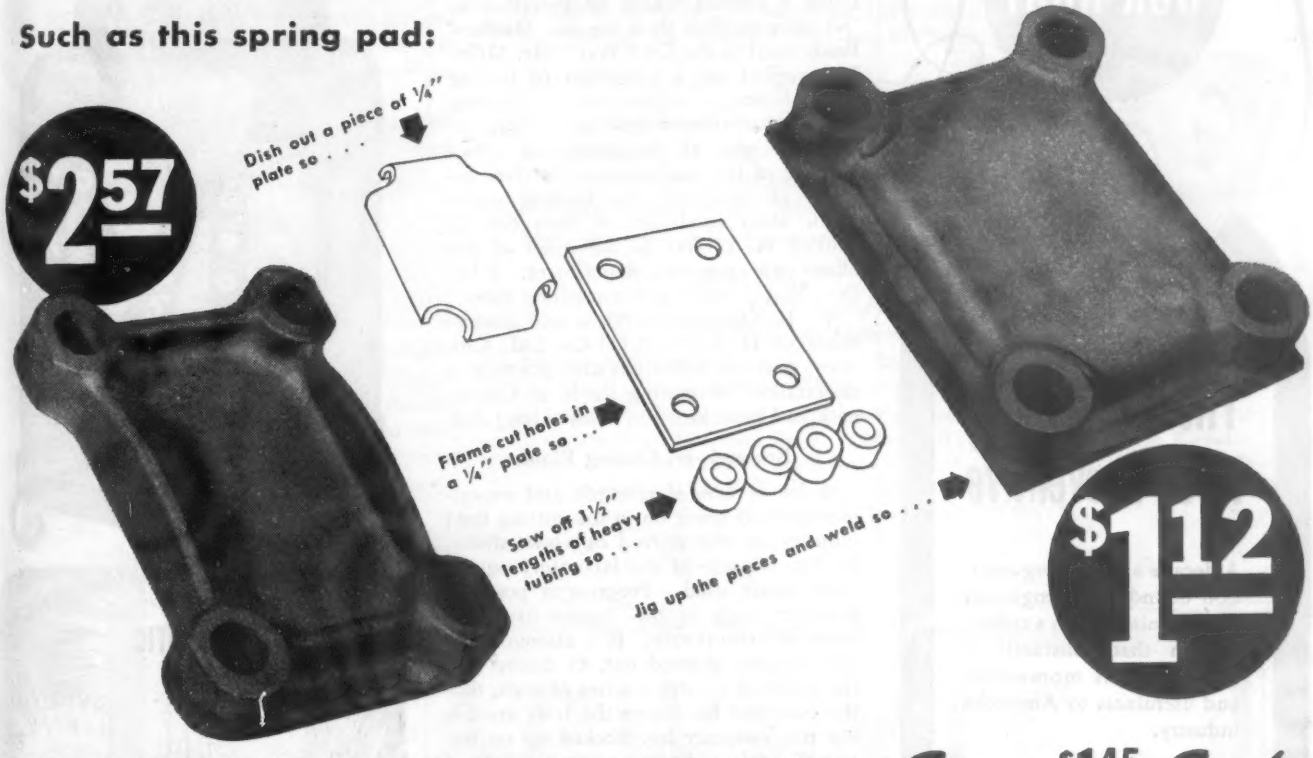
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Trends In Metal Cutting

(*Continued from Page* 121)

the intricate multiple angles of some of his three dimensional models, Dr. Kronenberg had "double exposure" stereoscopic slides made which the audience viewed on the screen through Polaroid spectacles. The effect was striking. Instead of the blurred double vision picture seen by the naked eye, the Polaroid spectacles resolved it into a three-dimensional view which actually seemed to be projected out of the screen into the room.

I was reminded of the work done recently by Carroll Miller, engineer, Cone Automatic Machine Co. Inc., Windsor, Vermont, in photographing the complicated tooling of eight-spindle automatics. Using a camera which he describes as "no more modern than the one Matthew Brady used in the Civil War", Mr. Miller has worked up a collection of tooling case histories which—when viewed through a stereoscope—give fully as clear an idea of the setups as actual viewing of the machines would give. Instead of studying the tooling under hectic shop conditions, it thus can be studied in comfort in the quiet of the office or engineering department. I believe that "they've got something there."

W. H. Oldacre, president and general manager, D. A. Stuart Oil Co. Ltd., Chicago, gave as forthright and practical a dissertation on cutting fluids at Cincinnati, as I have heard in many a long day.

Research on Cutting Fluids

A lot of careful research and experimentation is going on in the cutting fluid industry, as was proved by views shown by Mr. Oldacre of the laboratory equipment being used. Progress is possible, however, only to the degree to which users will co-operate. It is discouraging, Mr. Oldacre pointed out, to discover in the midst of a careful series of tests, that the customer for whom the tests are being run suddenly has stocked up on untested coolant because some salesman has taken one look at the job and announced, "We have the answer to the maiden's prayer!"

I have been impressed lately by the common sense methods which researchers such as Professors O. W. Boston and W. W. Gilbert at University of Michigan, and Fred W. Lucht, development engineer, Carboloy Co., invariably follow in their machining investigations. As I have remarked in previous reports, their work rooms are no "ivory towers". They are practical shops. That is where I recently found Dr. A. O. Schmidt—out in the shop, running a milling machine.

Fred Lucht, at the Cincinnati meeting, showed how he uses large scale wooden models for working out the positioning of work for most effective milling. Too many of the early proponents of carbide cutting emphasized the fast removal of metal but failed to pay any attention to the equally important problem of mounting cutters and holding the work. The latter easily can cancel out the former, as far as production is concerned.

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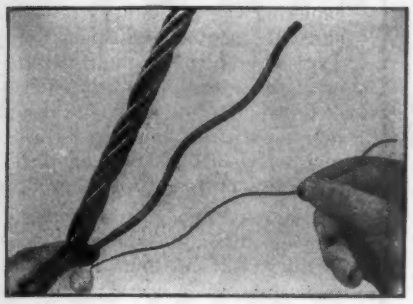
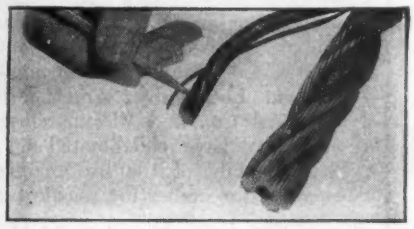


All wires and strands in Macwhyte PREformed are spiral shaped to fit naturally into position. When you select Macwhyte PREformed you get "the correct rope for your equipment," plus a personal interest in helping you get the most out of your rope.



All Macwhyte PREformed is internally lubricated! Macwhyte Wire Rope Lubricant is packed around each wire in all strands. This improves the sliding action of the wires as they move in bending around sheaves and drums. It also protects against inside corrosion.

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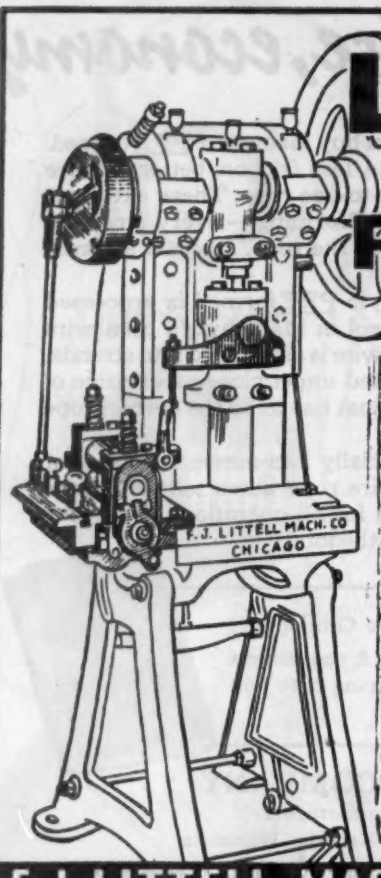

At left—Standard Style "M" Littell Roll Feed, equipped with a 3-roll Straightener, mounted on left-hand side of an O.B.I. press, feeding left to right. *Below*—same unit, including Littell Automatic Centering Reel.

FASTER production, better quality, lower costs, are assured with LITTELL Style "M" Roll Feeds—sturdy, efficient units that keep plant schedule going. Automatic in operation, they protect workmen's hands and lower insurance rates. Hardened and ground feeding rolls. Positive, silent roller drive for high speed, accuracy and durability. Two-piece driving disc, convenient feed adjustment and calibrated feed.

LITTELL Roll Feeds are made in Single- and Double-Roll types, for stamping, blanking, cupping, drawing operations. Capacities and models for handling stock up to .156" thick by 30" wide. Speeds, 50 to 200 strokes per minute. Length of stock advance per stroke up to 50". Stock usually fed to feeds from Littell Reels or Coil Cradles. Straighteners and Scrap Winders can also be provided.

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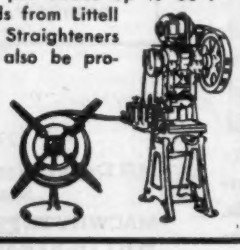

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Smaller . . . easier to handle . . . finer grain structure . . . more adaptable to the varied requirements of foundry operation. That's the new HannaTen ingot, produced in all grades of Hanna iron. Take advantage of this important development to attain more uniform distribution in the mold, to assure more accurate control of composition. It's another great Hanna "first."

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Industry Presses Study of High-Frequency Heating

High-frequency laboratories have been exploring the possibilities of alternating current heating of many products. Typical problems include the hardening of hacksaw teeth (without embrittlement of the supporting steel), the case hardening of wrist pins, the rapid curing of expensive woods, heating of plastics, and a variety of food-processing operations.

While use of high frequencies does not provide the answer to every industrial heating problem, there are many advantages, according to Westinghouse engineers. An excellent case is the use of a 2-kw unit in plastics manufacture. A number of common molded articles like electrical plugs, sockets, switch housings, mechanical parts, etc., are molded by the conventional method from a preform made of a mass of the plastic material which is placed into a hot mold, heated and then subjected to high pressure and temperature for a curing period. Bryant Electric Co., Baldwin-Southwark Div. of Baldwin Locomotive Works, Monsanto Chemical Co., and Westinghouse Electric Corp. have collaborated in an intensive study of the use of high frequencies for preheating plastic preforms.

Preforms Placed in Molds

These preheated preforms can be placed directly into the regular mold and, because of their semi-plastic state resulting from the high-frequency heating, it is not necessary to use the high hydraulic pressures now used in compression molding which occasionally reach 5000 pounds psi.

Need for generators of high-frequency power has led to development of standard units by Westinghouse. They say it is no longer necessary to have a generator designed to serve a given purpose. Most requirements can be met by the range of powers and frequencies now available in the accepted units. The smallest unit has an output of but 1 kw, the largest 200 kw. Between them lie units of 2, 5, 10, 20, 50, and 100 kw. Each size is available for several frequencies over some portion of the 200-500 kilocycle, and 2-30 megacycle bands.

Stock units are simple to operate and are completely self-contained. They require only electrical connection to a 60-cycle power source of 220 or 440 v. Oscillator, power supply, blower, and switches are housed in a single cabinet. An automatic-timing control permits load-cycle adjustment to a predetermined time, which can be automatically repeated. Terminals are provided for remote control. The larger size oscillators are benefitting from the unit construction idea.

—o—

According to Rubber Reserve Co.'s Report on the Rubber Program, 1940-1945, Butyl rubber has been found to be better than other substitutes for inner tubes, barrage balloons, and other pneumatic rubber products.

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SHELL RUST PREVENTIVES
OILS . . . FLUIDS . . . COMPOUNDS

THE BUSINESS TREND

Back-To-Work Movement Inspires Hope for Future

BACK-TO-WORK movement of strikers in some industries inspires hope that the return will become general enough to permit the nation to swing quickly into full-scale peacetime production.

Some of the principal barometers of industrial activity have been noticeably affected by the recent wave of strikes, and had there been no easing in the labor crisis the downward momentum in production would have multiplied as effect of the strikes spread.

While some of the principal indicators registered declines, such action was not in all cases the result of strikes within the industry represented by those indicators. In the steel industry, for instance, ingot production in the past two weeks has declined, not because of labor trouble in the steel industry but because of strikes in the fuel industry.

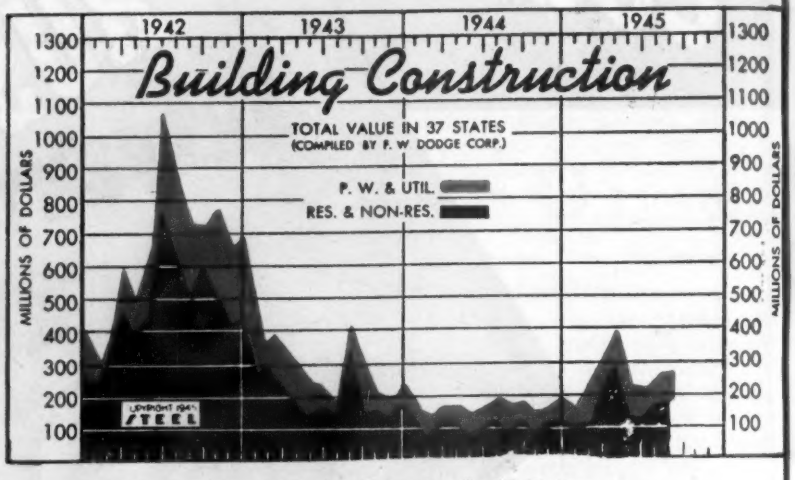
AUTO INDUSTRY—Likewise, strikes in parts suppliers' plants have seriously hampered the automobile industry in its return to peacetime production. After declining for several weeks, automobile production in the week ended Oct. 6 was only 9500 units, lowest weekly output in a number of years.

COAL—Also curtailed by strikes is coal production which in the week ended Sept. 29 was 5 per cent less than in the previous week. Production to date for the year continues to approximate 7 per cent less than for the corresponding period of last year.

STOCK MARKET—Despite strikes that have hindered reconversion, the stock market continues to reflect optimism for the future, and in the week ended Oct. 6 the Dow-Jones industrial, railroad, and utility averages again closed above the previous week. The industrial-share average closed 3.06 points higher, the railroad-share average was up 0.25 of a point, and the utilities-share average finished 0.11 of a point above the close of the previous week. Wall Street technicians are still looking for railroad stocks to offer a clue to the market for the rest of the year with the idea that if the railroads push into new high ground the whole trend would continue ahead even in the face of the advances the industrials and utilities have recorded.

CONSTRUCTION—Reflecting a return to peacetime activity, civil engineering construction volume for the week ended Oct. 4 totaled $74,731,000, the third highest weekly volume reported in 1945.

STEEL FORGINGS—Latest report on steel forgings indicates shipments of 305,845 tons in July were 14 per cent less than in June. Unfilled orders for steel forgings at the end of July dropped to 1,854,628 tons, 5 per cent under the previous month.



Construction Valuation In 37 States
(Unit—$1,000,000)

	Total		Pub'ic Works-Utilities		Res'dent'al and Non-Residential	
	1945	1944	1945	1944	1945	194
January	140.9	159.2	39.8	50.3	101 2	108.
February	147.0	137.2	32 0	55.1	115 0	82.
March	328.9	176.4	90 6	61.3	238 3	115.
April	395 8	179.3	111.9	72.0	283 9	107.
May	242.5	144.2	107.9	55.8	134 6	88.
June	227 3	163 9	95 0	70.7	132 3	93.
July	237.7	190.5	89.9	80 5	167 8	1.0.
August	263.6	169 3	77.5	69.4	186.1	99.
September	....	175 7	....	64 1	....	111.
October	....	144.8	....	52.2	....	92.
November	....	164.9	....	48.0	....	116.
December	....	188.5	....	66 6	....	121.
Total	....	1,993.9	....	746.0	....	1,247.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capac'ty)	82	83	73.5	95.5
Electric Power Distributed (m'll'on kilowatt hours)	4,028	4,039	3,909	4,375
Bituminous Coal Production (daily av.—1000 tons)	1,828	1,933	2,025	2,030
Petroleum Production (daily av.—1000 bbls.)	3,621	4,357	4,518	4,692
Construction Volume (ENR—Unit $1,000,000)	$74.7	$88.8	$80.8	$26.5
Automobile and Truck Output (Ward's—number units)	9,500	10,430	14,210	16,865

*Dates on request.

TRADE				
Freight Carloadings (unit—1000 cars)	791†	832	731	878
Business Failures (Dun & Bradstreet, number)	13	10	19	27
Money in Circulation (in millions of dollars)‡	$27,853	$27,729	$27,750	$23,881
Department Store Sales (change from like wk. a yr. ago)‡	+6%	+14%	0%	+12%

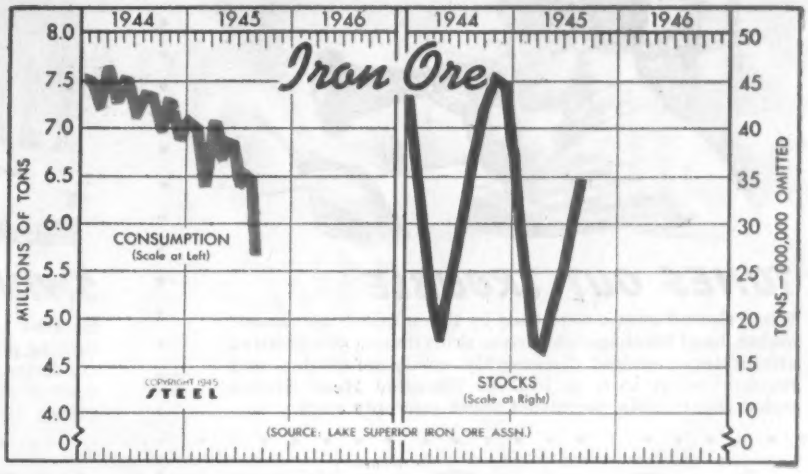
†Preliminary. ‡Federal Reserve Board.

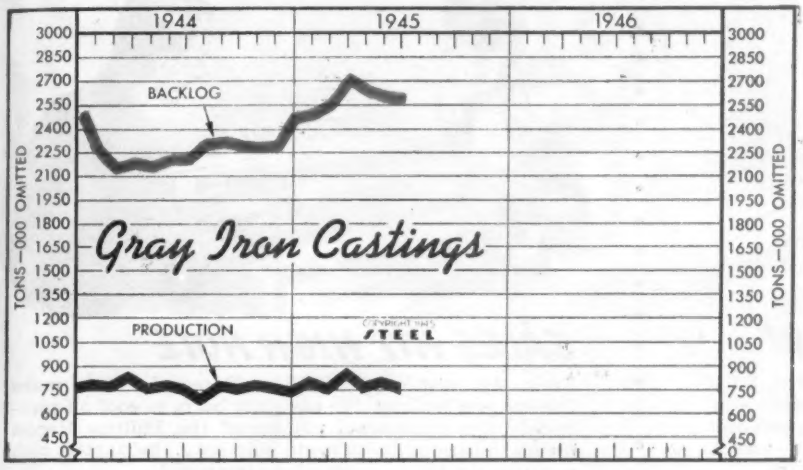
Iron Ore

(Lake Superior Iron Ore Assn.)

Gross Tons—000 omitted

	Consumption		Stocks at Lake Erie docks & furnaces	
	1945	1944	1945	1944
January	6,983	7,482	30,889	36,059
February	6,371	7,207	24,577	28,910
March	7,082	7,659	17,304	21,333
April	6,642	7,273	16,429	17,892
May	6,872	7,558	20,715	21,474
June	6,397	7,112	24,847	26,655
July	6,532	7,372	29,485	32,069
August	5,658	7,342	34,781	37,243
September	.....	6,950	.....	41,943
October	.....	7,320	.....	45,343
November	.....	6,883	.....	44,722
December	.....	7,090	.....	37,824





Gray Iron Castings

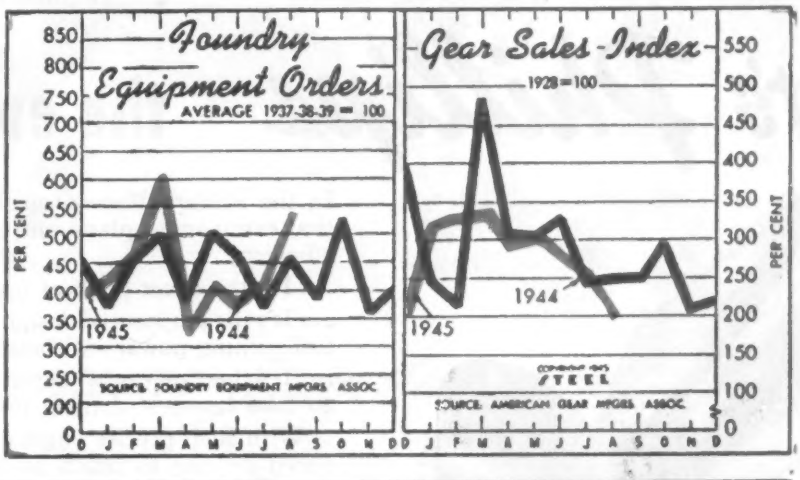
(U. S. Bureau of Census)

Tons—000 omitted

	Production		Backlog	
	1945	1944	1945	1944
Jan.	807	794	2 497	2 259
Feb.	753	773	2 562	2 145
March	851	841	2 714	2 184
April	769	766	2 641	2 139
May	806	789	2 603	2 205
June	773	766	2,596	2 213
July	...	698	.....	2 314
Aug.	...	778	.....	2 335
Sept.	...	769	.....	2 304
Oct.	...	788	.....	2 297
Nov.	...	770	.....	2 300
Dec.	...	744	.....	2 475
Mo. Ave.	...	773	.....	2,266

Foundry Equipment Orders and Gear Sales

	Foundry Equipment Orders Index (1937-38-39 = 100)			Gear Sales Index (1928 = 100)		
	1945	1944	1943	1945	1944	1943
Jan.	422.4	378.3	429.8	323	246	268
Feb.	465.3	456.8	399.5	331	214	303
Mar.	604.7	498.4	562.7	339	485	334
Apr.	325.0	385.7	362.7	296	308	240
May	404.7	503.9	348.9	309	305	342
June	375.4	466.1	413 6	271	328	401
July	411.7	375.8	379.4	264	242	374
Aug.	532 2	450.5	390.4	205	247	312
Sept.	....	388 0	346.6	...	248	320
Oct.	....	526.5	436 6	...	293	368
Nov.	....	369.5	388 0	...	209	387
Dec.	....	397.4	442.8	...	219	387
Ave.	....	433.1	408.4	...	279	336


Foundry Equipment Orders
AVERAGE 1937-38-39 = 100
PER CENT
1945
1944
SOURCE: FOUNDRY EQUIPMENT MFGRS. ASSOC.
Gear Sales Index
1928=100
1944
1945
COPYRIGHT 1945 STEEL
SOURCE: AMERICAN GEAR MFGRS. ASSOC.
J F M A M J J A S O N D J F M A M J J A S O N D

FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,448	$11,553	$9,331	$10,547
Federal Gross Debt (billions)	$262.4	$262.5	$263.2	$211.0
Bond Volume, NYSE (millions)	$31.8	$33.1	$30.6	$13.2
Stocks Sales, NYSE (thousands)	8,744	6,505	5,141	4,634
Loans and Investments (billions)†	$61.3	$61.6	$62.5	$54.7
United States Gov't. Obligations Held (millions)†	$45,140	$45,473	$46,371	$40,731

†Member banks, Federal Reserve System.

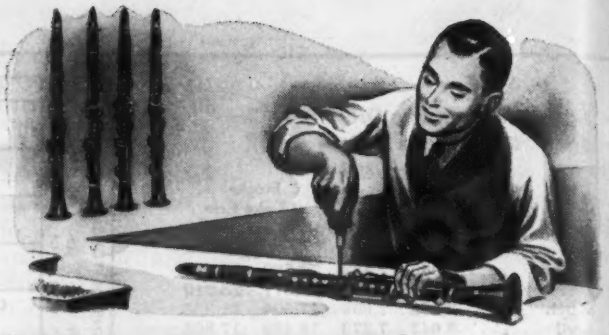
PRICES

STEEL's composite finished steel price average	$58.27	$58.27	$58.27	$56.73
All Commodities†	105.0	104.9	105.2	103.8
Industrial Raw Materials†	115.7	115.5	115.8	113.2
Manufactured Products†	101.8	101.8	102.1	101.1

†Bureau of Labor Statistics Index, 1926=100.

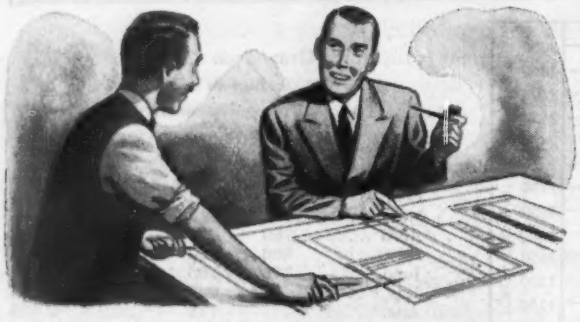
TUNES OUT TROUBLE

When slotted screws were used by this musical instrument maker, head breakage and driver skids damaged expensive assemblies – required disassembly, costly refinishing, and reassembly. A shift to Phillips Recessed Head Screws ended this trouble, permitted lower assembly costs.



SWING TO SAVINGS

Because the recessed head makes more efficient use of turning power, Phillips Screws can be set up tighter without danger of burring. As a result, fewer Phillips Screws are needed to make the rigid assembly required – a further saving in time and material.



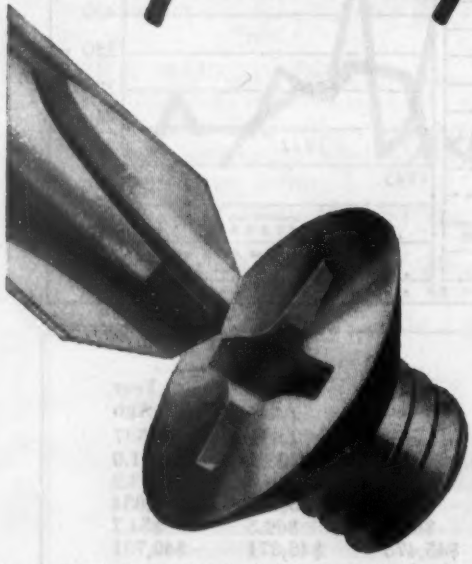
IN TIME WITH TOMORROW

Besides reducing costs and speeding up production, Phillips Screws help designers plan new, simpler methods of achieving strength, rigidity, and improved appearance. Result – a product in step with design trends – and a match for competition in tomorrow's tough markets.

SALES HIT HIGH NOTE

From the sales angle, Phillips Recessed Heads make fastenings a *feature!* No unsightly burrs to cool off prospects! The ornamental pattern of the Phillips Recess blends in harmony with modern design . . . helps start cash registers ringing a sweet sales symphony!

It's Phillips — the engineered recess!



In the Phillips Recess, mechanical principles are so correctly applied that every angle, plane, and dimension contributes fully to screw-driving efficiency.

. . . It's the exact pitch of the angles that eliminates driver skids.

. . . It's the engineered design of the 16 planes that makes it easy to apply full turning power – without reaming.

. . . It's the "just-right" depth of recess that enables Phillips Screw Heads to take heaviest driving pressures.

With such precise engineering, is it any wonder that Phillips Screws speed driving as much as 50% – cut costs correspondingly?

To give workers a chance to do their best, give them faster, easier-driving Phillips Recessed Head Screws. Plan Phillips Screws into your product now.

PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

Made in all sizes, types and head styles

25 SOURCES

American Screw Co., Providence, R. I.
Atlantic Screw Works, Hartford, Conn.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. M. Harper Co., Chicago, Ill.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
Manufacturers Screw Products, Chicago, Ill.
Milford Rivet and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., New York, N. Y.
Pawtucket Screw Co., Pawtucket, R. I.
Pheoll Manufacturing Co., Chicago, Ill.
Reading Screw Co., Norristown, Pa.
Russell Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Manufacturing Co., Waterville, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
The Steel Company of Canada Ltd., Hamilton, Canada
Wolverine Bolt Co., Detroit, Mich.

FLIES GET STUCK...

...SO DO UNLUBRICATED VALVES

But NORDSTROM VALVES

turn easily Forever

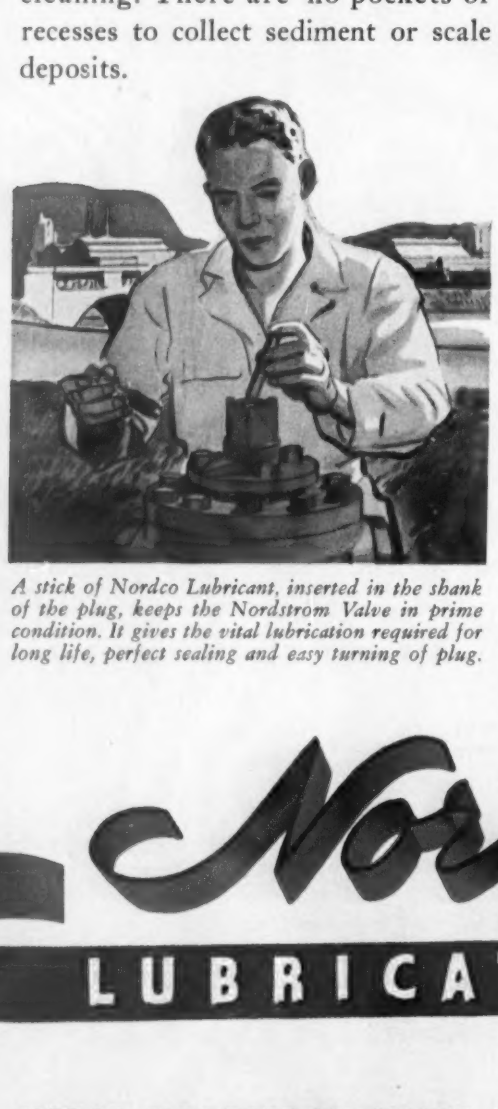
THEY'RE LUBRICATED

The valves with

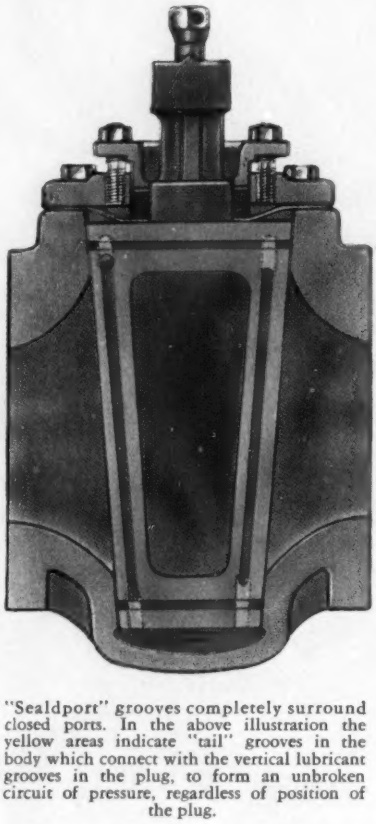
POSITIVE ROTARY ACTION

—port sealed with pressure lubricant

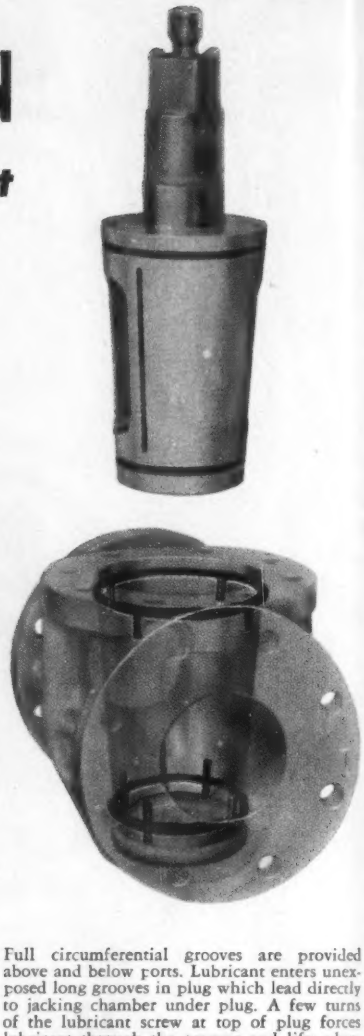
Nordstrom Lubricated Valves are built on the tapered rotary principle. It is the simplest and most positive valve action known. The taper of the plug and seat maintains an intimate working contact between the two parts at all times. Since the valve is opened and closed by rotation only, and *not* by raising or lowering the movable valve member, the vital seating surfaces are self-protecting and self-cleaning. There are no pockets or recesses to collect sediment or scale deposits.



A stick of Nordco Lubricant, inserted in the shank of the plug, keeps the Nordstrom Valve in prime condition. It gives the vital lubrication required for long life, perfect sealing and easy turning of plug.



"Sealdport" grooves completely surround closed ports. In the above illustration the yellow areas indicate "tail" grooves in the body which connect with the vertical lubricant grooves in the plug, to form an unbroken circuit of pressure, regardless of position of the plug.



Full circumferential grooves are provided above and below ports. Lubricant enters unexposed long grooves in plug which lead directly to jacking chamber under plug. A few turns of the lubricant screw at top of plug forces lubricant through the grooves and lifts plug, if overly tight.

Basic sealing principle in all Nordstrom Valves

The details of groove arrangements vary somewhat in different styles of Nordstrom Valves. However, all of the systems have two things in common—supply of a complete film around closed ports and cut-offs of any exposed portions of the grooves. The vital need for lubricant is evident. No *un*lubricated valve can offer such a positive seal against leakage or equal certainty of easy turning. Nordstrom engineering principles insure most efficient operation regardless of conditions.

KEEP UPKEEP DOWN

Nordstrom LUBRICATED VALVES

FOR ALL-PURPOSE SERVICE

Sealdport Lubrication

MERCO NORDSTROM VALVE COMPANY—*A Subsidiary of Pittsburgh Equitable Meter Company*

Main Offices: 400 Lexington Avenue, Pittsburgh 8, Penna. • *Branches:* Atlanta, Boston, Brooklyn, Buffalo, Chicago, Columbia, Houston, Kansas City, Los Angeles, New York City, Oakland, San Francisco, Seattle, Tulsa • *Canadian Licensees:* Peacock Bros., Ltd., Montreal

European Licensees: Audley Engineering Co., Ltd., Newport, Shropshire, England • *South American Representative:* The Armco Int'l Corp. • *Main Office:* Middletown, O.

PRODUCTS: Nordstrom Lubricated Valves; Air, Curb and Meter Cocks • Nordco Valve Lubricants • EMCO Gas Meters • EMCO-McGaughy Integrators • EMCO Regulators • Pittsburgh-National Meters for Gasoline, Grease, Oil, Water and other Liquids • Stupakoff Bottom Hole Gauge

Steel Schedules Upset as Fuel Shortage Cuts Output

OPA recommends $2 average increase on steel products . . . Wage parleys opened by unions . . . Production rate drops sharply

RESTRICTED production as a result of labor disturbances, combined with heavy demand, has thrown steel mill schedules greatly out of gear.

Some producers regard the situation as worse than in early war days, before inauguration of the Controlled Materials Plan. Some mills are four to six weeks behind on current shipments, notably on sheets and bars, and backlogs continue to increase in spite of the fact that orders have leveled off somewhat because of unsettled labor conditions.

Rationing by steelmakers is becoming more prevalent, with quotas set up in some instances and with orders carefully scrutinized in all cases. Some sellers are virtually out of the market temporarily, being unable to offer anything even suggestive of a firm delivery promise. Some orders are being accepted with delivery at mill convenience. Sheets, bars, pipe and shapes, among others, are in special demand. Within the past few days a leading producer set shapes up on a quota basis, effective Jan. 1. Some producers have been rationing hot and cold-rolled sheets on a quota basis since the end of the war and one has just opened books officially for first quarter, on the same basis as for the current quarter. Others are working out similar programs, but find it difficult in view of heavy commitments already made.

As a result of strikes in bituminous mines supply of coal and coke has been cut and estimated steelmaking rate for the week dropped sharply 8½ points to 73½ per cent of capacity. Greatest cut in production was at Youngstown, the rate dropping 18 points to 50 per cent. Pittsburgh declined 12½ points to 62, Chicago 9 points to 82½, Cleveland 4 points to 82 and eastern Pennsylvania 1 point to 75. In all other districts production continued at the same rate as the preceding week, Cincinnati 77, St. Louis 68, New England 82, Birmingham 95, Buffalo 86, Wheeling 88 and Detroit 84.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Oct. 13	Change	Same Week 1944	Same Week 1943
Pittsburgh	62	—12.5	92	101
Chicago	82.5	— 9	96.5	101.5
Eastern Pa.	75	— 1	93	95
Youngstown	58	—18	87	97
Wheeling	88	None	97	100
Cleveland	82	— 4	92	92.5
Buffalo	86	None	86	93
Birmingham	95	None	90	95
New England	82	None	89	95
Cincinnati	77	None	88	91
St. Louis	68	None	75	90.5
Detroit	84	None	84	87
Estimated national rate	73.5	—8.5	95.5	100.5

*Based on steelmaking capacities as of these dates.

Office of Price Administration has recommended an average increase of about $2 per ton on steel products as a measure of relief from increased production cost. This recommendation does not take into consideration any wage increase which may result from current negotiations between steel companies and unions. Possibility of further increase in steel price when the wage question is settled is left open. Not all products will be affected by the recommended increase. OPA has suspended price control on stainless steel products. This is the first steel product to be thus removed from control.

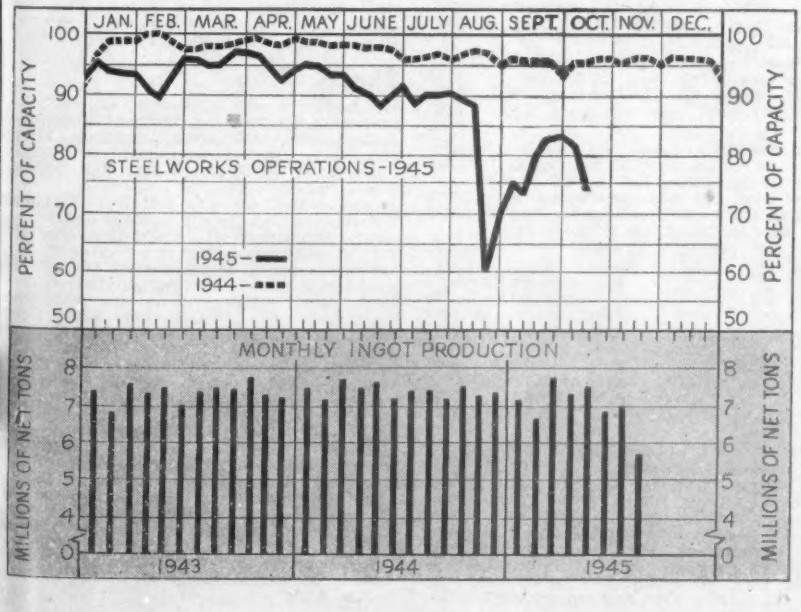
Conferences between CIO representatives and those of steel companies were started Oct. 10 at Pittsburgh and will be continued at other production centers. The question at issue is the demand for an increase of $2 per day in steel wages.

Buying of steel rails for 1946 delivery is getting well under way, following the placing of 100,000 tons a week ago by the New York Central. The Pennsylvania will close bids Oct. 24 on 150,000 tons of rails and 50,000 tons of accessories. Southern Pacific is reported to have placed 138,000 tons with two producers, and the Erie has placed nearly 29,000 tons.

Scrap continues in heavy demand, diminished pig iron supply causing heavier use of old material. On the other hand smaller steel production at some points has caused shipments to be held back temporarily.

Steel ingot production in September, first full month after the end of the war was 6,008,403 net tons, an increase of nearly 5 per cent over August. This was only 351 tons under the peak month of 1929, which still stands as the best peacetime year on record for steel production. For nine months output was 61,886,532 tons, compared with 67,375,801 tons in the corresponding period in 1944.

Average composite prices of steel and iron products are unchanged at ceilings, finished steel composite at $58.27, semifinished steel at $37.80, steelmaking pig iron at $24.05 and steelmaking scrap at $19.17.



COMPOSITE MARKET AVERAGES

	Oct. 13	Oct. 6	Sept. 29	One Month Ago Sept., 1945	Three Months Ago July, 1945	One Year Ago Oct., 1944	Five Years Ago Oct., 1940
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$56.73	$56.73
Semifinished Steel	37.80	37.80	37.80	37.80	37.80	36.00	36.00
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	24.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	16.50	20.20

Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; other, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material

	Oct. 13, 1945	Sept., 1945	July, 1945	Oct., 1944
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.57	2.47
Steel bars, Chicago	2.25	2.25	2.25	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.25	2.10
Plates, Philadelphia	2.30	2.30	2.30	2.15
Plates, Chicago	2.25	2.25	2.25	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.70	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.70	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.75	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.90	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$36.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	36.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	36.00	34.00
Wire rods, No. 5 to 7/32-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron

	Oct. 13, 1945	Sept., 1945	July, 1945	Oct., 1944
Bessemer, del. Pittsburgh	$26.19	$26.19	$26.19	$25.19
Basic, Valley	24.50	24.50	24.50	23.50
Basic, eastern del. Philadelphia	26.34	26.34	26.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.69	24.69
No. 2 foundry, Chicago	25.00	25.00	25.00	24.00
Southern No. 2, Birmingham	21.38	21.38	21.38	20.38
Southern No. 2 del. Cincinnati	25.30	25.30	25.30	24.30
No. 2 fdry., del. Philadelphia	26.84	26.84	26.84	25.84
Malleable, Valley	25.00	25.00	25.00	24.00
Malleable, Chicago	25.00	25.00	25.00	24.00
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	25.19	25.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap

Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$16.95
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.45	14.50
Heavy melting steel, Chicago	18.75	18.75	18.75	17.50
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$7.50	$7.50	$7.50	$7.00
Connellsville, foundry ovens	8.25	8.25	8.25	7.75
Chicago, by-product fdry., del.	13.35	13.75	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 21, 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O. may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives, Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18-in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—5/16 in. inclusive, per 100 lbs., $2.15 Do., over 5/16—47/64-in., incl., $2.30; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Mahoning Valley 2.32½c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c, (Calumet Steel Division. Borg-Warner Corp., and Joslyn Mfg. & Supply Co., may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		4100 (.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 2.35c on hot carbon sheets, nearest eastern basing point.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.70c; Granite City, base 3.80c; New York del. 3.94c; Phila. del. 3.78c; Pacific ports 4.25c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.36c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific ports 4.25c; copper iron, 3.90c; pure iron 3.95c; zinc coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; 20-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	....
65	7.25c	8.00c	....
58	7.75c	8.50c	....
52	8.55c	9.30c	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.25c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.25 lb. tin, $4.35; 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65; Granite City, $4.45, $4.60, $4.75, respectively

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed, 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 26-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.

Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c; Gulf ports, 3.85c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 4.30c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c; Gulf ports, 2.45c.

Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports; Kaiser Co. Inc., 3.20c f.o.b. Los Angeles).

Piling

Pittsburgh, Chicago, Buffalo 2.40; Pacific ports, 2.95c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.75c
Spring wire 3.25c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.90; galvanized, $2.55; Pac. ports ..... $3.40 and $3.05

Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.20c

Galvanized fence wire, 100 lb. Pittsburgh, Chicago, Cleveland 3.55c

Woven fence, 15½ gage and heavier, per base column ..... .67c

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
⅛	56	33	½	24	3½
¼ & ⅜	58	40½	⅝	30	10
½	63½	51	¾-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

	Steel			Iron	
In.	Blk.	Galv.	In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	54½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½-3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D		—Seamless— Hot	Cold		—Lap Weld— Charcoal
Sizes	B.W.G	Rolled	Drawn	Steel	Iron
1"	13	$ 7.82	$ 9.01	....	....
1¼"	13	9.26	10.67	....	....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $46 net ton, base, Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Base, per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
..	4	2	8	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	....	....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	....	§§18.00	19.00	....	....

*With 2-3% moly. ‡With titanium. †With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago Birmingham

Structural 3.75c
⅞- inch and under ..... 65-5 off
Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ..... $2.75-3.00 off

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ¾ x 6-in. and shorter	63½ off
Do., ⅞ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extra mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75
By-Product Foundry	
Kearney, N. J., ovens	13.05
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	†13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.28

*Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 26, 1945.
†14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11,50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (13 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.244[11]	4.715	6.012[20]	6.01
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.203[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.203[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[13]	4.872[14]	4.172[11]	4.772	5.816[20]	5.86
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[14]	4.152[11]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.141[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.265[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.85[21]	4.669	5.60[20]	5.75
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.75[21]	4.35	5.60[20]	5.75
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.85[21]	4.45[21]	5.60[20]	5.65
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.900[21]	4.659	5.93[20]	5.93
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[10]	5.443[24]	4.543[12]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[10]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[13]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[10]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.85[21]	4.65	5.75[20]	5.85
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.987[21]	4.787	5.987[20]	6.087
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	4.08[21]	4.78	6.08[20]	6.18
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.461[21]	5.102	6.09[20]	6.19
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.131[21]	4.931	6.131[20]	6.23
Memphis, Tenn.	4.015[3]	4.065[3]	4.065[3]	5.78[3]	3.965[3]	4.215[3]	4.215[3]	5.265[15]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[3]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.763[3]	4.313[3]	4.313[3]	5.313[26]	4.10[10]	3.75[21]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[5]	5.683[21]	5.613	5.85[20]	5.95
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.433[21]	7.333	8.304[20]	8.40
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[15]	5.633[21]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[15]	7.05[15]	5.883[21]	.....	.....	8.00

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 89,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash. (S/S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1 less $7 freight allowance	52.80

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 24, effective as of May 15. Price basing points which are also point of discharge of imported manganese ore is f.o.b. cars, shipside, dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.7

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnace

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.0
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.0
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.0
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.0
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.0
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.0
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.0
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.0
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.0

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	‡21.38	‡20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
‡Pittsburgh, del.				
No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa, base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. ‡For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenbridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base $1.25 higher, whichever is most favorable to buyer. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos.
f.o.b. furnace, Lyles, Tenn, $28.50
Semi-cold blast, low phos.,
f.o.b. furnace, Lyles, Tenn 33.00
(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $24.50
Valley base 24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del. Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: .Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $68.50

First Quality

Pa., Ill., Md., Mo., Ky	54.40
Alabama, Georgia	54.40
New Jersey	59.35
Ohio	47.70

Second Quality

Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	38.15

Malleable Bung Brick

All bases 63.45

Silica Brick

Pennsylvania	54.40
Joliet, E. Chicago	52.45
Birmingham, Ala.	54.40

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	32.90
Wire Cut	30.80

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded Magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.00 war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton, f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer; Rockdale or Rockwood, Tenn.; where Tennessee Products Co. is seller; Birmingham, Ala., where Sloss-Sheffield Steel & Iron Co. is seller; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. o.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome; (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom: 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil.4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15,25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max. sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract ton lots, $1.89, less, $2.01, eastern; freight allowed; $1.908 and $2.028, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 to c.l., 35c; central 34.25c and 36c; western, 34.55c and 36.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15%, net ton to carload, 8c lb. f.a.s. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c. Spot ½ cent higher.

Siminal: (Approx. 20% each Si, Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel Turnings	11.06
Chemical Borings	13.81
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Mach Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	22.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices.)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	12.32
Short Shovel, Turnings	14.32
Cast Iron Borings	13.32
Low Phos. Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	8.00- 9.00
Shoveling Turnings	9.00-10.00
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	19.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	9.50-10.00
Shoveling Turnings	11.50-12.00
Cast Iron Borings	11.00-11.50
Mixed Borings, Turnings	10.50-11.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2, Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.50
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut, Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 o.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B-107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots, Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers, sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224 lb; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Open market, spot, New York, $93-$98 per 76-lb. flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 70.625c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.48c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs or more; del; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%; Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.785
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz Metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Price f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross; die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 194

With sheet demand continuously heavy and various obstacles preventing all-out effort to attain capacity output many sheet and strip sellers are practically out of the market and no longer can make definite delivery promises. On most grades recent promises have been well into next year. Plain stainless sheets are in best position, with delivery possible in December and January, though on polished stainless deliveries are well into next year, some quotations being July and August. Most producers are well behind on current shipments, in some cases more than a month.

New York — Continued heavy demand for hot-rolled, cold-rolled and galvanized sheets, combined with production difficulties resulting from strikes and slowdowns has placed some producers practically out of the market, at least to the point where they no longer attempt to promise definite shipments. Most producers are already well behind on current shipments, in some cases much more than a month behind.

This situation not only applies to major grades of hot-rolled annealed, cold-rolled and galvanized, but also to electrical sheets and polished stainless sheets. While producers are able to make fairly definite promises on plain stainless sheets of shipments in December and January, they can do nothing on the polished until well into next year. Certain sellers are now actually quoting July and August, a jump of three to four months within a fortnight.

The situation in electrical sheets has reached the point where some sellers are completely out of the market, refusing to accept any orders until they have a better knowledge as to where they stand and what they can do. Pressure for low silicon sheets over recent weeks has been such that some mills are covered for all of next year.

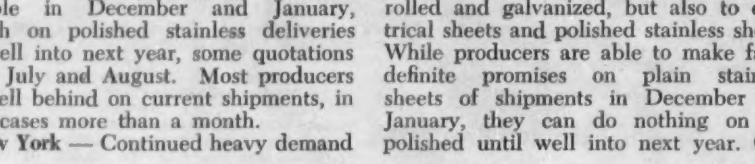
One leading seller who put the quota system into effect immediately upon the ending of the war, is now opening books for first quarter of next year, and it appears as if the quotas will be on about the same basis as for the current quarter.

Pittsburgh — Sheet and strip output since V-J day has been somewhat below expectations due to labor shortages in finishing departments and strike interruptions. Output also has been retarded by inadequate annealing and pickling facilities in relation to flat-rolled steel capacity. Leading steel producers are not booking all sheet and strip tonnage offered. In some instances commitments are not made further than three months, although many customers seek delivery protection well into next year. Present rationing system on sheets and strip, established by most sellers, involves the month by month assurance to regular customers of a definite proportion of overall output in relation to prewar ratios. No easing in pressure for early delivery is noted, despite strike interruptions among consumers. Heavy demand for export also is reported with one oil company recently distributing an order for 1946 delivery of over 35,000 tons of 18-gage drum stock for the Middle-East.

Further increase in orders for stainless steel sheets and strip is noted, with deliveries on polished items now extended into second quarter. However, stainless bars, plates and shapes are generally promised for December delivery. A 39-inch cluster-type cold rolling mill, said to produce a more uniform strip with a higher strength-to-weight ratio than now available, soon is scheduled to be installed in Washington Steel Corp.'s plant at Washington, Pa. This new company has purchased the plant and facilities formerly owned by Washington Tin Plate Co. and will install new machinery to handle stainless steel.

Philadelphia — In general hot-rolled pickled or cold-rolled sheets are not available before May. On some heavy gages of plain hot-rolled, somewhat better can be done, but this situation is tightening. Galvanized sheet deliveries fall late in second quarter, with some producers making no promises. Polished stainless sheets are a particularly scarce item, quoted for July and August by some sellers. Shipments on low-silicon sheets are even more extended.

Boston — Extended deliveries in all grades of sheets are not likely to be improved in the near future, as supply of semifinished steel for sheet mills is tightening. Demand continues high, but with orders down slightly in this area, due to deliveries and the fact that most buyers already have orders in for the next few months. Pressure for shipment is strong, notably from fabricators of household appliances. To meet most pressing requirements mills are rating tonnage to cover the greatest number.



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This is affecting warehouse share. Inquiry for stainless, polished especially, is brisk. Narrow strip schedules have moved further into first quarter. One installation of a caster-backing principle precision cold strip mill has been made in New England, a four-inch unit by North American Phillips Co., Lewiston, Me., reducing alloy steel, including molybdenum. The mill was built by Waterbury-Farrel Foundry Co., Waterbury, Conn.

Cleveland—Although demand for sheet steel continues active, labor disturbances have resulted in curtailment of final processing of some orders, adjustments in rolling schedules, and postponement of some shipments. This applies particularly to flat-rolled alloy products used extensively in the automotive industry. Some auto manufacturers who had set up production schedules for October, for instance, have postponed opening pending improvement in the general labor situation and in prospects for an uninterupted flow of materials. Silicon electrical sheet books are filled through May with heavy inquiry coming from transformer, generator, and motor industries, which had practically no reconversion problems. Buying of roofing sheets has been restricted, due to the light-weight coating which must be applied under government regulations. Demand for low-alloy, high-strength strip is improving. Strip steel books generally are filled through February while stainless strip deliveries extend to June.

Chicago — Despite labor disturbances which have delayed reconversion of the automobile industry, builders maintain pressure for sheet delivery. On new business, most mills are unable to quote better than second quarter. Cold-rolled sheets and strip and galvanized sheets are tightest. Consumers show no disposition to defer ordering even though their reconversion programs have been delayed, apparently preferring to acquire the material and hold it until needed.

Cincinnati — Sheet mills continue under pressure for deliveries, with no easing apparent. The allotment problem, as demand exceeds supply, is perplexing mills and any relief from reconversion delays is in degree only. Backlogs in cold-rolled and galvanized are furthest extended, but there is pressing demand for all sheets. Production schedules are loaded to the limit of manpower.

St. Louis — Flat-rolled steel production in this area was cut to 70 per cent of capacity during the first week of October because of labor shortage and a strike at the plant of the principal pig iron producer. Mills are short an estimated 12 per cent in labor supply. The transportation, food and oil industries are inquiring for heavy tonnages and order backlogs are larger than at any time during the war. Hot-rolled sheets are booked to second quarter, electrical sheets to September and cold-rolled to fourth quarter. No delivery promises are being made on galvanized.

Steel Bars . . .

Bar Prices, Page 194

Barmakers are falling increasingly behind on deliveries, both because of heavy demand and on account of labor disturbances. In some cases they are at least a month behind promises. Definite delivery promises are almost impossible to make under present circumstances, some tentative quotations of second quarter being made recently. In small squares and rounds second quarter is about the earliest, with some promises of March on medium and larger rounds.

Pittsburgh — Heavy demand is noted for small bars, with mills scheduled into January and February. No decline in pressure for October delivery from automotive partsmakers has yet occurred, despite strikes in the automotive industry, while demand from railroad equipment and farm implement companies has shown further gains lately. Forge shops are operating at a fairly good level, and cold-drawers report order backlogs expanding. The present relatively tight situation in carbon steel bar supply, with the exception of large rounds, which are available for early December delivery, has been accentuated by reduction in bar mill operations developing out of the recent sharp curtailment in primary steel operations. Some improvement is noted for alloy bars and mills are still able to offer November delivery for large and small sizes.

New York — Bar sellers continue to fall behind on current requirements, due primarily to labor disturbances of one sort or another. Some mills are behind at least a month and find it increasingly difficult to make delivery promises on new tonnage. Pressure for light squares and rounds, particularly the rounds, is resulting in tentative delivery promises

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of late second quarter; and even on medium and larger size rounds little tonnage is now available before March in many instances.

Boston — Retention of a substantial element of simplification in product grouping operative during the war, involving bars and bar shapes notably, is regarded favorably by most producers on grounds of economy and efficiency; but demand and competition will supply the answer to what degree. In shapes demand already has developed for certain rolls in sizes out of production several years. Potential ramifications are greater in bars, alloys especially. One leading producer of alloys formerly made over 1400 alloy analyses compared with slightly more than 400 during the war. Some expansion of the latter number may be unavoidable, but return to 1400 is deemed unnecessary. An influencing factor in this may hinge on possible revisions in basing point policy for alloys, already operative in stainless. Meanwhile demand for bars, while spotty, is slightly heavier in smaller carbon sizes.

Philadelphia — Pressure for small rounds for diverse uses, is outstanding in the bar market. Most mills quote second quarter, May or later in some cases. At the same time shipments on medium and large rounds are deferred further, with most offerings in February and beyond. Alloy tonnage still can be had for six to eight weeks, although one large seller now is in January.

Chicago—Deliveries on carbon bars have now slipped into second quarter, next year. Buying continues heavy and consumers are insistently pressing for deliveries, particularly to the automobile industry. With the coal strike interfering with steel production, bar schedules probably will suffer progressively. Although alloys have strengthened in demand, they still lag behind carbon bars.

Steel Plates . . .

Plate Prices, Page 195

Plate demand is holding at a higher rate than had been expected when the drop from heavy shipbuilding requirements took place. Some promises for December delivery are possible, with most platemakers booked into February. Heavy plates lag but light gages are eagerly sought for tanks and similar products. Floor plate orders have resumed about a normal volume after the war flurry.

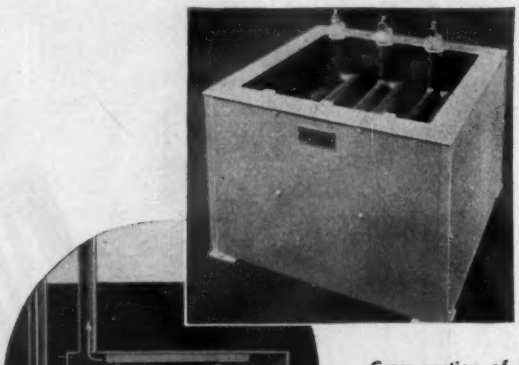
New York—Some eastern mills still can accept plate tonnage for December delivery; others, however, are booked up for the year and at least one producer has no more sheared plate available before February. Some of this scarcity in plates is ascribed to diversion of steel to other products, nevertheless there is a fairly brisk demand, much better at this time than was anticipated a few months ago. Special demand continues for light plates for fuel oil tanks, and for export.

Boston — Plate fabricators, small tank shops excepted, are buying sparingly and demand for heavy sizes is slack. Structural shops, most of them heavier consumers through war subcontracts, require only a fraction of former tonnage. Builders of heavy industrial equipment account for some miscellaneous volume, but most are covered through this year. Warehouse buying also reflects contraction in shipbuilding; floor plate orders are back to normal volume with distributors' inventories in better balance. Most mills are now in December on light plates; heads are still available for November delivery.

Some ship plates are still to be disposed of but surplus sales are not a disturbing factor. Most shipyard inventories were worked down as contracts tapered. Covering two weeks in the last compilation, 350 tons were moved as surplus, most to a government procurement agency; Lally Column Co., Cambridge, bought 110 tons and a smaller lot went to Springfield Gas Light Co.

Cleveland—Demand for light plates has improved steadily and bookings have reached substantial volume. Inquiry is originating in a large number of comparatively small plants, those producing pressure and storage tanks being especially active. Many locomotive orders which will require heavy plate tonnage are pending but this type of business has not yet become a strong market factor.

Chicago — Railroad cars, tanks and storage containers, and miscellaneous heavy construction provide a strong demand for steel plates. While plate production is considerably below earlier months this year, it is at a higher level than had been expected. Demand for other products is pressing plates sharply, and this pressure may increase now that the coal strike has interfered with steel



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production. Mill schedules are full for the remainder of the year.

Birmingham — Plate production is at a high rate, mills being loaded with orders for tank plates, and lighter plates handled through warehouse are unobtainable except in small lots. Some scattered plate tonnage is still going into shipbuilding.

Tubular Goods . . .

Tubular Goods Prices, Page 195

Boston — Demand for merchant steel pipe has moved most mill schedules beyond January. Buying is largely for distributor stocks in anticipation of heavier building. Mechanical tubing orders are fair, but overall buying of tubing has shifted substantially since the war end. Alloy aircraft volume is down, but inquiry for so-called bedstead tubing by furniture manufacturers and grades used by miscellaneous industrial users, such as bicycles, is sharp. Mills are well into first quarter. Cast pipe activity always is slow at this season, but Boston recently bought 330 tons of eight-inch from the Everett foundry.

Pittsburgh—New demand for seamless and butt-weld pipe is somewhat below expectations, although a moderate improvement has been noted recently. Some new line pipe projects are said to be temporarily held up, due to difficulty in arriving at accurate cost estimate. However, considerable seamless tonnage is scheduled to go into new line pipe construction, while an increasing tonnage is being diverted to the automotive trade. Heavy demand also is anticipated this year in building up jobbers' stocks. Mill order backlogs on butt-weld are extended into February in most instances, with about the same delivery promise available on seamless pipe.

Hope Natural Gas Co. is planning $2 million development from its Clarksburg, W. Va., field to connect with its line in Kanawha county, W. Va. National Tube Co. will improve its facilities for producing butt-weld pipe at Lorain, O., by installing new equipment and by moving equipment from other plants.

Philadelphia — More merchant pipe sellers are setting up sales on a monthly quota basis. Some have such a plan already operating and others, including one large producer, expect to have a similar plan in operation by Jan. 1. Producers urge jobbers to limit orders to a month to eliminate specification changes. Boiler tubes and most specialties are not affected as deliveries show no signs of getting out of hand. Base periods for establishing quotas vary but in one important instance they are predicated on average shipments for 1937-39, inclusive.

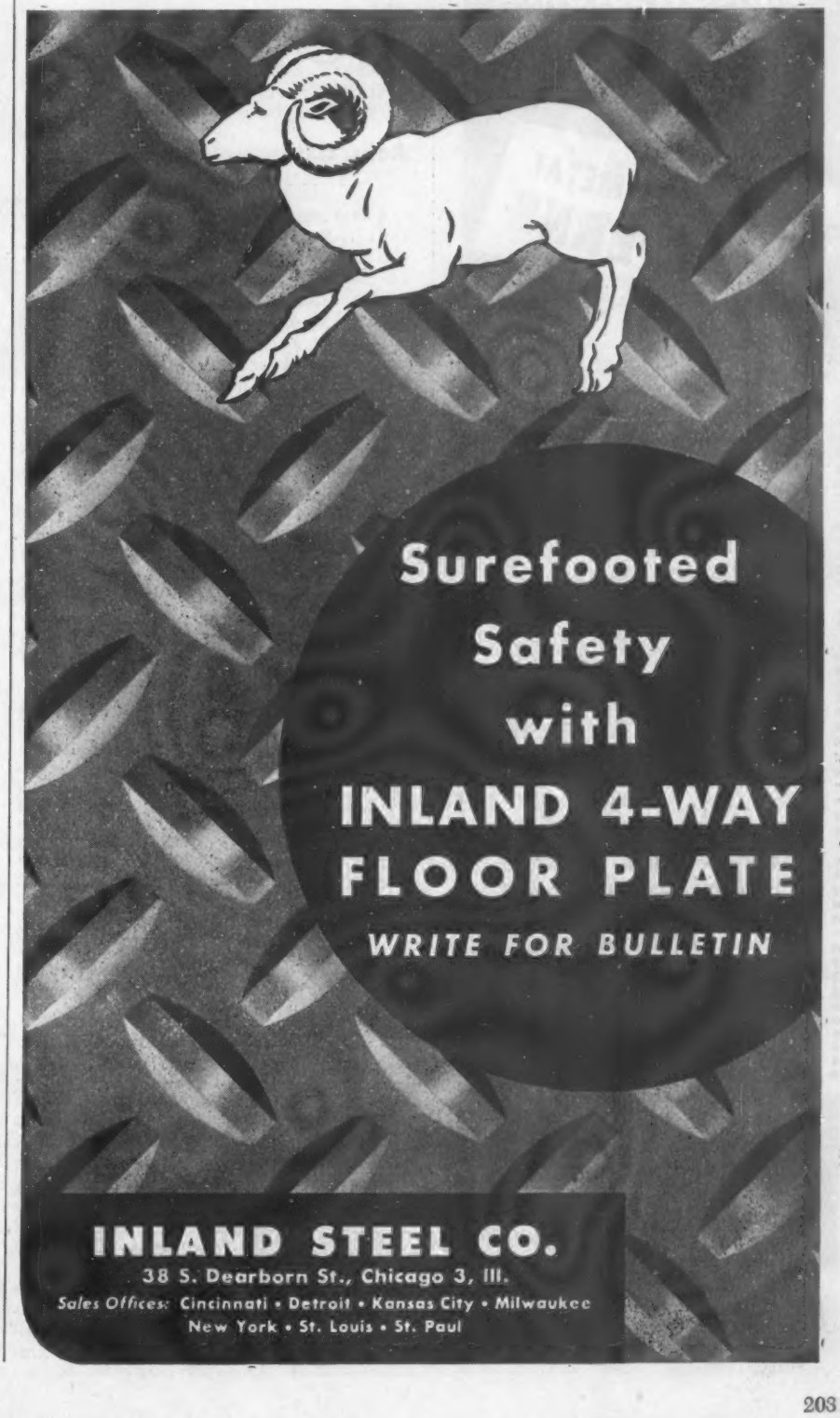
Cleveland—Spread between pipe demand and supply is widening and no easing is expected for at least six months. Line pipe deliveries are extended into first quarter and oil country goods to the latter part of that period. Two continuous-weld mills that have been operating at 100 per cent capacity were shut down Oct. 5, due to shortage of coke oven gas and as a fuel conservation measure. One of these mills reopened however early last week. Closing of these mills has disrupted shipping schedules but the full effect will not be known until the month end. With distributors pressing for stock replacements, the situation is viewed as critical. Oil country items are moving in large volume with heavy demand maintained.

Wire . . .

Wire Prices, Page 195

Boston—Wire orders are subsiding slightly but are in excess of shipments with some mills. Producers are making no inroads on backlogs, with production schedules filled for first quarter. Large gaps opened by loss of war tonnage are filled with civilian orders, involving a wider range of products, and delivery pressure from automotive and other consumers is unabated as needs for mounting reconversion activity increase. Producers have set up their own allocation systems, spreading available tonnage among as many consumers as possible. Backlogs and current schedules are heavily banked with long process type of material. Annealing, patenting and special finishing departments are taxed, complicated by labor shortages and limited output by regular crews. This has forced some eastern mills to maintain a work week in excess of 40 hours, with overtime. Some departments are operating seven days in at least one case. Demand for spring wire is notably strong and there is little indication of earlier duplicate buying.

Chicago — Manufacturers of bed springs report inability to obtain anywhere near required quantities of carbon spring wire, now that restrictions on their product have been lifted. Wiremakers are



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confronted with extremely heavy demand for galvanized wire. A Midwestern canmaker has received orders for 64,000,000 can keys, to consume between 2000 and 3000 tons of galvanized wire, and wishes to begin production this month. Second quarter, 1946, is best delivery one wire mill can give. With continued tightness in the general steel situation, jobbers are giving up hopes of building inventories of merchant products soon.

Buffalo — Tapering of wire shipments to automotive manufacturers during the strike period is minor as most consumers continue to call for materials to replenish depleted inventories. Heavy diversified demand for prompt shipment is met from industries completing reconversion. Motor and furniture manufacturers are placing orders far in advance for spring wire.

Birmingham — In spite of wire production as heavy as during the war, demand is in excess of production and deliveries are much delayed. Nails and wire fencing are especially tight.

Rails, Cars . . .

Track Material Prices, Page 195

Pittsburgh — Pent-up demand for rails is exceptionally heavy, for during the war railroads obtained an average of about 65 per cent of state requirements. Outlook for 1946 is for greater demand than capacity to produce. Steel producers already are booked through first half next year on car wheels and on axles into first quarter. The Pennsylvania railroad soon is expected to place orders for more than 200,000 tons of rails. Increased export requirements are another factor crowding current production schedules.

New York—Domestic freight car awards in September were the heaviest so far this year, amounting to 12,840 cars. This compared with 7240 in August, the second largest total, and brought the aggregate for the first nine months up to 38,346, as compared with 34,486 in the corresponding period of last year. Further comparisons follow:

	1945	1944	1943	1942
Jan.	7,200	1,020	8,365	4,253
Feb.	1,750	13,240	350	11,725
March ...	2,500	6,510	1,935	4,080
April	1,120	4,519	1,000	2,125
May	1,526	1,952	870	822
June	670	1,150	50	0
July	3,500	795	4,190	1,025
Aug.	7,240	3,900	8,747	0
Sept.	12,840	400	6,820	1,863
Oct.	....	2,425	5,258	0
Nov. ...	....	1,065	870	0
Dec.	....	16,245	2,919	135
Total	....	53,221	41,355	26,028

Structural Shapes . . .

Structural Shape Prices, Page 195

In spite of lack of drafting room employes, which is slowing up estimates on structural projects, and uncertainty as to construction costs and delivery of materials, deliveries on plain material are being pushed further ahead, some mills now quoting February. A heavy backlog of work has built up and will fill fabricating shops to capacity when they can be released for bids.

New York — Despite slowing in construction demand as a result of uncertainties as to wages and deliveries of material, most structural shops are still confronted with more work than they can figure with existing drafting room forces; and, further, notwithstanding this slowing in construction demand, there is still enough work to push shape mill deliveries further ahead. Some shape producers are now quoting February.

Early action is expected on the award of 2000 tons for a research development for the Standard Oil Co. of Jersey at Linden, N. J., on which G A. Fuller Co. is the general contrac

Boston — Structural steel inquiry new boiler plants and additions is notably active in the moderate volume of industrial activity. Stafford Iron Works, Worcester, Mass., will fabricate 256 ton for an addition and alterations, Crompton & Knowles Loom Works, one of several industrial contracts placed. Except for small bridges in Maine and Massachusetts, public works programs lag and several larger private projects are delayed by uncertainty as to costs and estimates. Contributing to tightness in smaller sizes, beams and channels, is brisk export inquiry with most mill schedules in January and beyond on shapes under eight-inch.

New York — Various bridge jobs ar pending in New York and other east states and are in such numbers fa cators cannot figure them promptly. F jobs requiring steel shapes were oper by New York state Oct. 10, on thr of which no bids were received and the other two bids were too high.

Philadelphia—Little shape tonnage available before February, in spite of fact structural demand has slowed, pen ing clarification of wage policies. More tonnage is being offered than can be figured by fabricators but sufficient is getting through to extend deliveries. One mill has set up a quota system, effective Jan. 1.

Chicago — Heavy activity continues in industrial construction and structural fabricators find themselves pressed to handle business offered. More shops are completing work remaining on the books at the end of the war, and are preparing to take on new contracts. Virtually all structural mills are sold out for the balance of the year. Outstanding award of the week is 2400 tons for a Chevrolet plant expansion in Indianapolis and a noteworthy inquiry is 2500 tons for a Tribune Square development in Chicago.

Pittsburgh — Output of structural steel here so far this month is substantially below expectations, due to sharp curtailment in operations at Carnegie-Illinois Steel Corp.'s structural mills at its Homestead works to 60 per cent of capacity. To meet increasing demands for fabricated steel in mid-western and western states, American Bridge Co., Pittsburgh, will increase output at its Gary, Ind., plant through a broad modernization program which includes rearrangement of fabricating facilities and increasing working area 10 per cent.

Birmingham — Shape supply is exceedingly tight in this area, with demand heavy. Fabricators report heavy bookings through the year and some business being taken for early weeks of next year.

Seattle — Fabricating shops expect much civilian business soon, as a large number of projects are planned. Jackson county, Oregon, plans a 450-foot steel span over Rogue River, plans by Paul B. Rynning, Medford, Oreg. Park-

land, Wash., opened bids Oct. 11 for a 150,000-gallon elevated steel water tank. The Navy will open bids Oct. 26 for a steel tower at the Coast Guard station at Port Angeles, Wash.

Pig Iron . . .

Pig Iron Prices, Page 197

Tightness increases in the pig iron market, particularly unsettling in face of the near approach of winter. Coal strikes, cutting down coke production, are reducing iron output and integrated blast furnaces are affected as well as merchant, cutting off possibility of aid from that direction. Most foundries have low reserves for this season and are unable to add to them. Early end of the coal strike may allow melters to get by with such supply as is available.

Boston—With winter approaching, pig iron supply is tightening and consumers who in some cases have been permitted to exceed 30-day inventory find difficulty in placing additional iron. Sellers are supplying all iron possible to this area, about balancing melt, which would be heavier except for labor shortage. Castings subcontracting continues on a broad base and shops are unable to take all volume offered. Cast iron pipe foundry melt continues on the basis of three days a week, lacking workers. Basic consumers are operating with low reserves for this period of the year. Curtailment at some integrated furnaces dims outlook for increased tonnage from steelworks furnaces to ease the situation in the near future.

New York—Movement of pig iron to district foundries is still sufficient to maintain the melt; however, continuation of labor troubles in the soft coal region for another week or so would probably be sufficient to reduce not only the flow of iron but also of coke to a point where a reduction in casting output would be necessary. Stocks of iron and coke at local foundries is limited, particularly with regard to coke. As noted recently, some sellers of by-product foundry coke have already reduced shipments 50 per cent or more. Foundries which have been relying principally on truckloads of coke instead of carloads are the consumers likely to be hit first and hardest. On the other hand, if there is an early settlement in the soft coal dispute, most consumers will be able to weather the storm.

Cleveland—Extensive shutdowns of foundries within two weeks to a month are expected if the present critical coal situation continues. Foundries have small pig iron reserves, being limited to a maximum of 30 days' needs. No shutdowns have been reported to date because of lack of iron. Shipments of merchant iron already have been curtailed following the banking of many blast furnaces due to lack of coal. Republic Steel Corp., for instance, had seven blast furnaces idle late last week, only one of which was down for relining. Total melt this month probably will be below that for September, despite a slight gain in foundry employment. Gray iron foundries in this district are operating at only 60 to 65 per cent of the rate that could be attained if adequate manpower were available.

Philadelphia — Shortage of pig iron has increased, not only as a result of banking of a large eastern furnace two weeks ago but by further curtailment at Buffalo, all the result of soft coal strikes. One Buffalo producer, a regular supplier to eastern Pennsylvania, banked a small furnace a few days ago and this, combined with temporary difficulties in restoring normal production at his large stack, blown in last month after being down since early in the year, has resulted in delays in both basic and foundry shipments.

Chicago — With pig iron production declining due to the coal strike, foundries are threatened with insufficient supply to maintain melts. So far, no loss has occurred, and iron sellers are controlling shipments carefully to give equitable distribution. Melters are pressing for shipments as a safeguard against interruption, for even before the coal strike occurred they found it impossible to build inventories up to the 30-day allowed maximum. These difficulties arise at a time when foundries were getting some relief in manpower.

Pittsburgh — Pig iron output here was hard hit last week by coal shortage developing out of coal strikes. Toward the close of last week 31 out of 54 blast furnaces were in operation, with further reduction imminent should the coal strike continue. Foundry operations have not been curtailed yet although such a move appears inevitable soon. The critical supply situation in coke is illustrated by fact that all of the H. C. Frick Coke Co.'s beehive ovens are banked and U. S. Steel Corp.'s

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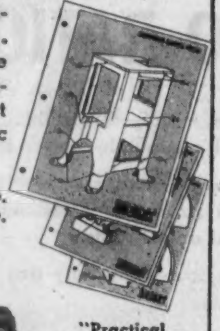

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by-product coke operations at its Clairton works has been reduced to 31 per cent of capacity.

Buffalo — Coke production has been curtailed by coal strikes and an important pig iron producer is scheduled to bank a blast furnace this week. Donner-Hanna Coke Corp. announces its coke output has been cut 20 per cent of capacity, coal shortage being more serious than at any time during the war. Foundries are pressing for additional pig iron shipments as the labor situation eases slightly. Partial settlement of labor troubles in the Detroit area is reflected in heavier shipments to automotive foundries there.

Cincinnati—The foundry melt is holding at recent levels and although pig iron supply is considered tight shipments into this district have been prompt and steady. Backlogs of castings orders are large with not much chance for expantion in output. This district is dependent on foundry iron from other districts where production conditions are being watched closely.

St. Louis — Tightness in pig iron has been aggravated by a two-day strike at the blast furnace of Koppers United Co., sole pig iron producer in this area. Granite City Steel Co., the company's largest hot metal consumer, was able to continue steel production by use of cold metal.

Birmingham — Merchant pig iron supply is well balanced with demand, though the situation is not tight, conditions being steady. Production is down somewhat as the Tennessee Coal, Iron & Railroad Co. has blown out its No. 3 stack at Ensley for repairs.

Scrap . . .

Scrap Prices, Page 198

Strength has been added to the scrap situation by the coal strike and ceiling prices, springboards and other factors are in effect. Reduced pig iron supply has caused larger scrap use in its place. Supply still is short and dealers are hampered by labor shortage in efforts to collect and process.

Pittsburgh — No buying of consequence developed last week, with only a few scattered purchases of small quantities reported. Sharp curtailment in steel operations, with indications of further retrenchment due to the coal strike is cited as the chief factor behind current lack of interest in scrap. No hold-up on shipments of previous orders is reported here, although one large mill in the Youngstown area has done so. Up to $1 freight equalization continues to be paid on heavy melting steel and short shoveling turnings; 50 cents springboard is also reported paid on machine shop turnings. Turnings output is low and supply of good open-hearth grades and cast scrap is limited. Freight equalization up to $5.50 a ton is being paid in effort to augment movement of cast scrap into this district.

Chicago—Strong demand is maintaining ceiling prices. Another influence is that banking of blast furnaces because of the coal strike is causing steelmakers to place heavier dependence on scrap to maintain steelmaking operations. Demand for borings and turnings for blast furnace use has picked up, as they provide heavier yield. It is understood that blast furnace material has been sold at full ceiling within the past few days, after several weeks at 75 cents to $1.75 below. Prime grades of heavy melting steel are none too plentiful in this district.

Boston — Steelmaking grades of scrap are at ceiling, but in case of turnings and bundles buyers hold rigidly to specifications regarding alloys in carbon material, rejecting or adjusting prices if contaminated. Cast grades are in limited supply. Most consumers are unable to build inventory. Watertown arsenal offer of 200 tons of heavy unprepared steel brought a high bid of $10.28 and three-way alloy $6.69, somewhat higher than the current market on that grade of alloy. At Fort Devens bids are in on two offerings totaling 8285 tons, including 7835 tons at port of embarkation, South Boston, to be moved at rate of 20 to 25 cars daily.

Philadelphia — Trend in scrap buying continues mixed. Some consumers press for scrap to offset increasing shortage of pig iron while others show less interest, either because of restrictions in their melt or likelihood of early restrictions. Two eastern Pennsylvania steel plants are holding up shipments for the second week, affecting blast furnace and open-hearth grades. In general prepared heavy melting steel is moving freely and there is demand for all borings and turnings available. Philadelphia Navy Yard opened bids recently for the second time on 10,000 tons of unprepared scrap after unsatisfactory first bids, said to have averaged at least $2.50 per ton under ceilings. However, the Navy sold 4000 tons of prepared heavy melting steel to one dealer at a good figure and 3000 tons of alloy scrap to several buyers. Prices on the latter were below ceiling but were considered satisfactory.

New York — Scrap buying is generally strong, although movement in turnings and cast grades is still restricted by small supply. Longshoremen's strike has not affected domestic scrap shipments as the harbor movement is handled by railroad lighterage, which has not been restricted. Barge shipments of upstate scrap are handled by scrapyard employes as is regularly the case.

Buffalo — Strength has increased in the scrap market as continuation of the coal strike is expected to curtail coke production and consequent reduction in pig iron output. A leading mill is scheduled to curtail basic iron production this week if the coal shortage continues. An important scrap dealer reports turning down inquiries because of insufficient supply. This further drain on reserves adds to apprehension over winter supply.

Cincinnati — The iron and steel scrap market continues firm. However, uncertainties, such as a possible coal shortage, and delays in reconversion, have created a conservative policy for some interests. Not all offerings on railroad lists are bringing ceiling prices because brokers tend to reduce bids when outlets are not readily available. Moreover, specialties are not in active demand. Foundries have been active buyers, and now appear to have adequate reserves.

St. Louis — Scrap shipments have improved a trifle but still are at least 25 per cent below normal. Mills are placing few new orders and foundries have accumulated sufficient reserves to ease their pressure. Prices, except on

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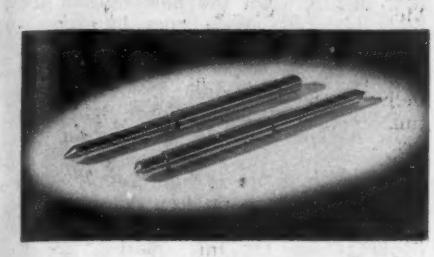

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borings and turnings, are at ceilings. Heavy melting, rails and cast grades are in heaviest demand. The coal strike, threatening pig iron supply, has increased inquiry for scrap. Remote points report slight improvement in labor supply.

Birmingham — Demand for scrap has quickened during the past few days. Cast grades are in especially good demand, compared with rather slow inquiry for steel grades. No springboard is being paid on ceiling prices.

Los Angeles — Dealers complain that mills are buying at $4 to $8 under ceiling, mainly No. 1 grades from shipyards, and thus discouraging collection from other sources. Recent pay raises at scrap yards have added to cost and while ceiling prices prevail in eastern districts prices are well below ceiling on the Coast. Mill stockpiles are reported as normal.

Seattle — Scrap is in easy supply and ample tonnage is being offered. Mills are buying with discrimination and are not increasing inventory materially. The price for steelmaking scrap remains at $10 per gross ton, delivered.

Warehouse . . .

Warehouse Prices, Page 196

New York — Demand for warehouse centers heavily in flat-rolled products; sheet and strip inventories are out of balance. Mill replacements of these, cold-finished carbon bars and shapes are not improved. Stainless sheet inquiry is active, notably polished. Tool steel and alloy bars, including stainless, are slow.

Pittsburgh — Distributors' inventories are in fairly good balance, except in sheets and wide flange beams. New demand, while somewhat below wartime level, is holding up well. Fact that civilian goods production is gaining momentum, despite retarding influence of strikes in some instances, plus extended mill deliveries on most steel products, are said to be chief reasons why shipments out of warehouse stocks have not shown the anticipated sharp post V-J Day decline. Pressure for deliveries is especially severe for hot and cold-rolled sheets and strip, galvanized sheets, hot-rolled bars, galvanized pipe and wire.

Buffalo — Warehouse stocks are said to be the largest for some time but in many items assortments are broken and deliveries are deferred. Bookings in sheets and bars extend many weeks. Galvanized sheets are scarcest. Demand in general is close to the wartime peak.

Los Angeles — Cold-finished bars and all grades of sheets are consistently scarce, with mill deliveries six to eight months behind. Other merchant items are in sufficient supply to meet demand. Individual orders are smaller but total movement is holding up well. Demand based directly on reconversion is expected to gain slowly over the next six months.

Tin Plate . . .

Tin Plate Prices, Page 195

Pittsburgh — Easing in limitations governing use of tin is indicated, based on reports that considerable tonnage of refined tin has been found in Malaya. An early revision in WPB order M-81 probably will permit use of 0.25-pound electrolytic tin plate for all soldered parts of such containers as coffee, beer and oil cans. Tin plate production schedules

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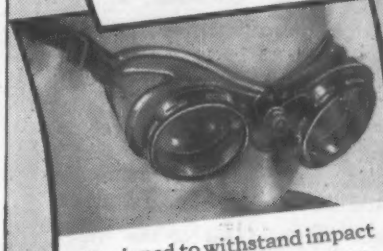

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are booked well into first quarter, with output of all tin mill products this quarter likely to reach 875,000 tons. However, current production schedules are jeopardized, along with other steel products, as result of bituminous coal shortage. This could very likely force tin plate producers to carry over a considerable proportion of their fourth-quarter commitments into next year.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 195

New York — Bolt and nut backlogs have shrunk since the end of the war, there having ben a particularly sharp reduction in heavy construction requirements. Some producers now have about nine to ten weeks work on hand. However, there is an active demand for small short bolts for export and for industrial assembly fasteners; also for certain specialties. Moreover, the lag in heavy construction items is not expected to be prolonged for, admittedly, a heavy building program is in prospect, which should get under way rapidly, as soon as the future becomes clarified with respect to general wage policies and material deliveries. All in all, bolt and nut manufacturers are highly optimistic over the outlook for some months.

One of the difficulties at present is in getting steel. Bar producers are falling behind on current requirements, as much as a month in some cases, and deliveries are far extended on new orders. On the smaller sizes of bars, such as are turned out on a 10-inch mill, some promises run late into second quarter.

The industry on an average, it is said, has now placed its weekly working schedule down to around 45 hours, as compared with 52 at the time many were forced on a straight single turn as a result of labor shortage. Bolt and nut manufacturers are having difficulty getting the additional men they now need.

Semifinished Steel . . .

Semifinished Prices, Page 194

Pittsburgh — The tight balance in semifinished steel supply and requirements has become more critical with reduction in ingot operations at nearly all plants the past week, due to bituminous coal shortage. Some nonintegrated companies, without the benefit of government directives, are particularly hard pressed in obtaining sufficient sheet bars and other semifinished items. Integrated mills also meet difficulty in some instances. Demand for forging billets is not as heavy as for other items. British steelmakers are in the market for an estimated 50,000 tons of small rerolling billets and slabs for delivery over the remainder of this year.

Canada . . .

Toronto, Ont. — There are no indications of immediate easing in supply of steel materials in Canadian markets. Necessary plant repairs now proceeding at most steel mills, and shortage of skilled workers, are retarding production of steel and rolling mill products. Against reduced output mills are loaded with orders and buying continues brisk. However, most current bookings are for first quarter delivery and at the moment it appears that some steelmakers will have big carryovers into 1946, as they will be unable to fill all orders booked before the end of this year.

Steel sheets continue most in demand and bookings now extend well into first quarter. Sheet production is below actual demands but slated for an increase next month when the new unit at the Steel Co. of Canada goes into operation. Lifting of restrictions on use of sheets has not helped consumers to any large extent, due to difficulty in obtaining delivery. Sheets generally are tight, with mills booked solid to the end of the year.

Carbon bars are in tight supply, with demand heavy. Barmakers report no additional capacity for this year and all bookings are for first quarter. Alloy bars are not so tight and some makers are offering delivery in December, but available capacity is not large.

Steel plates remain in a fairly easy position with unfilled capacity remaining for the current quarter. New plate buying, however, has increased in the past couple of weeks, with heavier placements by car and locomotive builders. The mining industry again is becoming a factor in the plate market and increased buying is expected from this source as mining operations improve with better labor supply.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2400 tons, additions to body building, Indianapolis, for Chevrolet Commercial Body Division, General Motors Corp., to Midland Structural Steel Co., Chicago, for fabrication by Allied Structural Steel Companies; W. E. O'Neil Construction Co., Chicago, contractor.

600 tons, Woolworth store, Bridgeport, Conn., to American Bridge Co., Pittsburgh.

400 tons, factory building, J. & J. Corrugated Co., Fall River, Mass., to Phoenix Bridge Co., Phoenixville, Pa.

400 tons, expansion, Waldorf Paper Products Co., St. Paul, to St. Paul Engineering & Mfg. Co., St. Paul.

330 tons, warehouse buildings for Charles Lenning Co., Philadelphia, to Lehigh Structural Steel Co., Allentown, Pa., through F. B. Warren Co., general contractor, Philadelphia.

330 tons, highway bridge, Freeport, Ill., for state highway commission, to Illinois Steel Bridge Co., Jacksonville, Ill.; bids Sept. 14.

285 tons, beam spans, various locations, for Chicago, Milwaukee, St. Paul & Pacific railroad, to Bethlehem Steel Co., Bethlehem, Pa.; bids July 5.

260 tons, power house, North Little Rock, Ark., for Ebasco Service Inc., to Arkansas Foundry Co., Little Rock, Ark.

256 tons, additions and alterations, Crompton & Knowles Loom Works, Worcester, Mass., to Stafford Iron Works, Worcester; E. Whitehead Inc., general contractor.

225 tons, bridge, Eden Valley, N. Y., to Bethlehem Steel Co., Lackawanna, N. Y.; McLain Construction Co., Buffalo, contractor.

225 tons, Erie railroad bridge No. 1534 in New Jersey, to Phoenix Bridge Co., Phoenixville, Pa.

132 tons, building, East Chicago, Ind., for Edward Valve & Mfg. Co., to American Bridge Co., Pittsburgh; bids Aug. 20.

STRUCTURAL STEEL PENDING

10,500 tons, vertical lift bridge, Terminal Island, Calif.; bids postponed from Oct. 3 to 24, Navy officer in charge of construction, Terminal Island, Bureau of Yards and Docks, spec. 17365.

2500 tons, Tribune Square development, Chicago, for Chicago Tribune Building Corp.; R. C. Wieboldt Co., Chicago, contractor.

2200 tons, Navy administration building at

White Oaks, Md.; bids Oct. 10.

000 tons, research development, Standard Oil Co. of New Jersey, Linden, N. J.; George A. Fuller Co., New York, general contractor.

200 tons, Beverwyck Brewery, Albany, N. Y.

00 tons, manufacturing buildings at Kankakee, Ill., for Armstrong Cork Co., Lancaster, Pa.; bids asked.

00 tons, box factory, Salem, Mass.

00 tons, warehouse, Jackson, Miss., for the Merchant Co.

Unstated, 450-foot steel bridge over Rogue River, Oregon; bids soon; plans by Paul B. Rynning, Medford, Oreg.

REINFORCING BARS . . .

REINFORCING BARS PLACED

992 tons, including 922 tons bars and 70 tons wire mesh, additions to body building, Indianapolis, for Chevrolet Commercial Body Division, General Motors Corp., to Truscon Steel Co., Youngstown, O.; W. E. O'Neil Construction Co., Chicago, contractor.

340 tons, wire mesh, SBI route 5, Sec. 16-R, Kendall and DeKalb counties, Illinois, for Illinois state highway commission, to American Steel & Wire Co., Chicago; Powers Thompson Construction Co., Joliet, Ill., contractor; bids July 20.

300 tons, bridge, Eden Valley, N. Y., to Bethlehem Steel Co., Lackawanna, N. Y.

200 tons, additions and alterations, Louisville, Ky., for Sears, Roebuck & Co., to Joseph T. Ryerson & Son Inc., Chicago; B-W Construction Co., Chicago, contractor.

134 tons, addition, John Deere Tractor Works, Deere & Co., East Moline, Ill., to Carnegie-Illinois Steel Corp., Chicago.

120 tons, addition for Theodore Hamm Brewing Co., St. Paul, to Bethlehem Steel Co., Bethlehem, Pa.; William Baumeister Construction Co., St. Paul, contractor.

REINFORCING BARS PENDING

324 tons, 188 tons bars and 136 tons mesh, overpass and widening, route 25, Camden-Pennsauken, N. J.; bids Oct. 29, state highway commissioner, Trenton.

173 tons, new building No. 9, Chicago, for Belden Mfg. Co.; bids Oct. 10.

PIPE . . .

CAST IRON PIPE PLACED

330 tons, 8-inch, Boston, to Warren Pipe Co., Everett, Mass.

160 tons, 10-inch for Salem, Oreg., and 8-inch for Dallas, Oreg., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

Unstated, new water system for Central Point, Oreg.; plans by Paul B. Rynning, Medford, Oreg.; bids soon.

Unstated, $50,000 improvements to water system, Pullman, Wash.; bids soon; Stevens & Koon, Portland, Oreg., engineers.

PLATES . . .

PLATES PENDING

5000 tons, 30-inch steel water pipe for Lebanon, Pa.; bids Oct. 22.

Unstated, 150,000-gallon elevated steel water tank for Parkland Light & Water Co., Parkland, Wash.; bids Oct. 11.

RAILS, CARS . . .

RAILS PLACED

Central of New Jersey, 6000 tons steel rails, to Bethlehem Steel Co., Bethlehem, Pa.

Southern Pacific, 138,000 tons steel rails, to Colorado Fuel & Iron Corp. and a United States Steel Corp. subsidiary.

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CLEVELAND—Lee Tool Co., 4131 Broadway, James L. Berkey and William T. Tengler, proprietors, has been incorporated with $500 capital and 500 shares no par value, to manufacture automobile parts and accessories.

CLEVELAND—A. W. Hecker Co., A. W. Hecker, president, 1966 East 66th St., manufacturer of jigs, fixtures and special machinery, will start a $250,000 expansion and build new plant costing about $150,000 to house new division for manufacture of pumps.

CLEVELAND—Pioneer Mfg. Co., 3053 87th St., has let contract to Paugh & Brown, 6007 Euclid Ave., for a two-story 60 x 150-foot plant addition to cost about $100,000. (Noted Sept. 24.)

CLEVELAND—Electric Products Co., 1725 Clarkstone Rd., has let contract to Sam W. Emerson Co., 1836 Euclid Ave., for a one-story 80 x 200-foot plant building to cost about $100,000.

CLEVELAND—Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., has let contract to Paugh & Brown, 6007 Euclid Ave., for a plant building to cost about $250,000. Arthur E. Rowe & Associates, 1909 Euclid Ave., are architects.

COLUMBUS, O.—B. & T. Metals Co., 446 West Rich St., has let contract to E. Elford & Son, 555 South Front St., for a plant building to cost about $45,000.

COLUMBUS, O.—Minneapolis Moline Power Equipment Co., C. W. Fearee, district manager, 444 North Front St., has let contract to C. M. Barr, 299 South St., for a warehouse, office and distribution building, to cost about $165,000.

EUCLID, O.—Euclid Road Machinery Co., 1361 Chardon Rd., has let contract to Albert M. Higley Co., 2036 East 22nd St., Cleveland, for a one-story assembly addition 140 x 200 feet at St. Clair Ave. and Bliss Rd., to cost about $200,000. H. M. Morse, 1500 Superior Ave., Cleveland, is engineer.

GIRARD, O.—Penn-Ohio Kool Vent Metal Awning Corp., Youngstown, has been incorporated to manufacture an aluminum awning, and has bought the former Sheet Metal Mfg. Co. plant here, containing 25,000 square feet of floor space. William F. Ballentine of Storm Sash Inc., 1817 East High St., Youngstown, is one of the incorporators.

LIMA, O.—Westinghouse Electric Corp., S. M. Pague, engineer, Malone Bldg., Pittsburgh, has let contract to Green & Sawyer Co., Dominion Bldg., for a plant addition 60 x 100 feet, to cost about $50,000.

LORAIN, O.—Nelson Specialty Welding Corp., T. Nelson, president, is establishing plant in American Shipbuilding Co. warehouse, at Toledo Ave. and 28th St., for production of portable stud welders.

MANSFIELD, O.—Tappan Stove Co., 240 Wayne St., will build a one-story 200 x 500-foot plant costing about $600,000 at Murray, Calloway county, Ky.

MIDDLETOWN, O. — Sorg Paper Co., 901 Manchester Ave., has let contract to McGraw Construction Co., American Bldg., for a building housing boilers and water treatment plant, to cost about $500,000. J. E. Sirene & Co., Greenville, S. C., are engineers.

MICHIGAN

ANN ARBOR, MICH.—Pittsfield Products Inc., 1943 Jackson Ave., has been incorporated with $10,000 capital to manufacture metal screens and strainers, by Dale Fosdick, 1409 Harper St., Ann Arbor.

DETROIT—Sturdy Tool & Gage Co., 14520 Schaefer Hwy., has been incorporated with $150,000 capital to manufacture machinery, dies, tools, jigs and gages, by Albert A. Robinson, 909 Pagel St., Lincoln Park.

DETROIT—Parker Wolverine Co., 2501 East Grand Blvd., plans a metal-treating plant; contract to L. G. Markey Inc., 12650 Lyndon Ave., to cost about $50,000.

DETROIT—Service Plating Co., 2000 West Lafayette, has been incorporated with $75,000 capital to do a general polishing and buffing business, by Marian Cooke, 6651 Tiremas St., Detroit.

DETROIT—Tool Industries Inc., 11308 Jos. Campau Ave., has been incorporated with $50,000 capital to manufacture tools, dies and gages, by Francis W. Haines, 12390 Evanston Ave., Detroit.

DETROIT—Power Service Corp. of America, 1242 Buhl Bldg., has been incorporated with 100,000 shares no par value to manufacture engines and machinery, by Carl L. Helquist, 16753 Plainview Ave.

ESCANABA, MICH.—Escanaba Paper Co. plans plant addition for finishing room.

KALAMAZOO, MICH.—U. S. Foundry Corp. is building a one-story gray iron foundry, 90 x 180 feet and core room 30 x 60 feet.

MARQUETTE, MICH.—Cliffs Dow Chemical Co. plans plant addition to cost about $100,000, including equipment.

MARQUETTE, MICH.—Brebner Machinery Co. Inc., distributor of highway construction and industrial machinery, will let contract soon for a one-story service building 106 x 162 feet.

ROSEVILLE, MICH. — Versnick Mfg. Co., 26405 Gratiot Ave., Roseville, has been incorporated with $50,000 capital to manufacture gasoline engines, parts, tools and equipment, by George V. Versnick, 17466 Anglin St., Detroit.

ILLINOIS

AURORA, ILL.—All-Steel Equipment Co. Inc. will let contract soon for a one-story plant addition 237 x 327 feet, with another unit to be built later. E. O. Sessions & Co., 1 North LaSalle St., Chicago, are engineers.

BELVIDERE, ILL.—Sanitary Scale Co., computing scales, plans plant addition 82 x 173 feet, to cost about $100,000.

ELGIN, ILL.—Elgin National Watch Co. plans plant addition. Olsen & Urbain, 75 East Wacker Dr., Chicago, are architects.

JOLIET, ILL.—William E. Pratt Mfg. Co., castings and hardware specialties, has let contract for a one-story plant addition 40 x 90 and 40 x 70 feet.

NORTH CHICAGO, ILL.—Deepfreeze Division, Motor Products Corp., 2301 Davis St., is building an addition of 40,000 square feet to give it 180,000 square feet of manufacturing space, at cost of $1,800,000. Products will include industrial chilling units for tempering metals, as well as home freezers.

NORTH CHICAGO, ILL.—Zapon Division of Atlas Powder Co. plans five-story plant to cost about $300,000.

WAUKEGAN, ILL.—Johnson Motors, outboard motors, will build a two-story plant addition to cost about $150,000.

INDIANA

FORT WAYNE, IND.—Mayer Tool & Die Co., Lincoln Highway, plans a one-story plant addition costing about $50,000.

HAMMOND, IND.—Standard Oil Co. of Indiana, 910 South Michigan Ave., Chicago, is having plans prepared for a research laboratory to cost $2 million. Holabird & Root, 333 North Michigan Ave., Chicago, are architects.

MISSOURI

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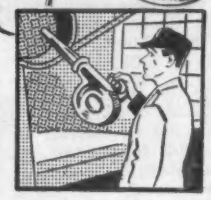

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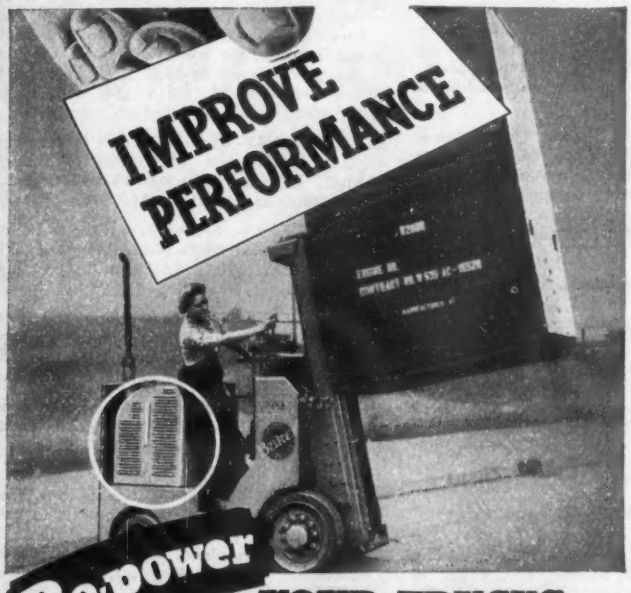

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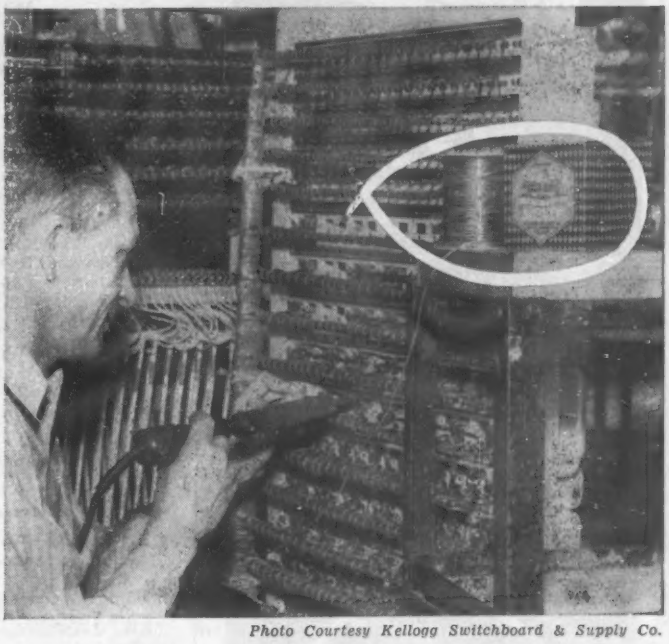

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PROTECTOSEAL

Equipment Co., 1501 Guinotte St., trailer manufacturer, will let contract soon for a one-story plant 60 x 300 feet.

NORTH KANSAS CITY, MO.—J. E. Donaldson Mfg. Co. has let contract for a one-story plant 100 x 120 feet.

NORTH KANSAS CITY, MO.—North Kansas City Development Co. is building a one-story plant 200 x 440 feet, which will be operated by the Falls Spring Co.

WISCONSIN

FOND DU LAC, WIS.—Fred Rueping Leather Co. will let contract soon for a two-story tannery addition 74 x 446 feet.

GENOA, WIS.—Dairyland Power Co-operative, E. J. Stoneman, chairman, Genoa, plans a power plant costing about $1,250,000. V. E. Alden, 120 South LaSalle St., Chicago, is consulting engineer.

JANESVILLE, WIS. — Gilman Engineering Works, 214 North First St., has let contract to Severson & Schlintz, 1002 Beloit Ave., for a one-story 90 x 160-foot plant. A. Kuenzi, 202 North Water St., Watertown, Wis., is engineer.

JANESVILLE, WIS.—Gilman Engineering Works has let contract for a one-story plant 90 x 160 feet. Arthur Kuenzi, Watertown, Wis., is engineer.

KENOSHA, WIS.—Specialty Brass Co. has let contract for a one-story plant addition.

LA CROSSE, WIS.—LaCrosse Novelty Box Mfg. Co. plans factory to cost about $150,000.

MILWAUKEE—Capitol Stampings Corp. has been incorporated to manufacture stampings and dies, by E. B. Schwibinger, 2343 North 83rd St., and associates.

NEW LONDON, WIS.—American Plywood Corp. plans a one-story plant 100 x 250 feet.

OSHKOSH, WIS.—Wisconsin Axle Division of Timken-Detroit Axle Co., truck axles, has let contract to Ben B. Ganther Co. for additional story to machine shop, 50 x 200 feet.

STEVENS POINT, WIS.—Weber Lifelike Fly Co., fishing tackle manufacturer, has let contract for additional story to present plant, 100 x 100 feet, and a three-story addition 40 x 60 feet.

STILES, WIS.—Oconto Electric Co-operative, Oconto Falls, Wis., has plans under way for a dam and hydro-electric power plant, to cost $325,000, including equipment. Orbison & Orbison, 206 West College Ave., Appleton, Wis., are consulting engineers.

WAUKESHA, WIS.—Waukesha Motor Co., gasoline and diesel engines, has let contract to Hunzinger Construction Co., Milwaukee, for a one-story plant addition.

WAUKESHA, WIS.—Universal Milking Machine Co. will let contract soon for a one-story addition 60 x 120 feet.

WAUSAU, WIS.—Wilson-Hurd Mfg. Co., aluminum name plates, dials, etc., plans a one-story plant addition.

IOWA

BURLINGTON, IOWA — Mangold Lightning Protection Co. will resume production of copper cable lightning conductors and fixtures after three years inactivity.

CEDAR RAPIDS, IOWA—Rapid Loader Inc. has been organized to manufacture a new type dirt and manure loader and has contracted with St. Croix Shipbuilding Co., Bayport, Minn., to manufacture its product.

STORM LAKE, IOWA—Gilstad & Hebron Mfg. Co. plans plant for production of cement block manufacturing machinery.

WEBSTER CITY, IOWA—Beam Mfg. Co., clothing washing machines, has let contract for a one-story plant addition.

MINNESOTA

MINNEAPOLIS—Freeman Mfg. Co., machine tools, is building a one-story machine shop 25 x 100 feet at 3320 East 41st St.

MINNEAPOLIS—Scott-Atwater Mfg. Co., metal products, 2901 East Hennepin Ave., is building a one-story plant addition.

SHAKOPEE, MINN.—Alloy Metals Co. is expanding foundry, including new cupola, and will increase capacity from 40,000 to 75,000 pounds per day.

ST. PAUL—Stainless Steel Products Co., 1000 Berry Ave., which tripled its plant for war production, has started civilian production, including tanks and dairy equipment and soon will start manufacture of gas furnaces and ice cream equipment.

ST. PAUL—Waldorf Paper Products Co., manufacturer of boxes and cartons, is building a one-story addition 280 x 384 feet, to cost about $225,000.

IDAHO

HAGERMAN, IDAHO—Idaho Power Co., 1220 Idaho St., Boise, Idaho, has let contract to Morrison-Knudson Co. Inc., 319 Broadway, Boise, for a power plant to cost about $2,500,000, including equipment. H. L. Senger is chief engineer.

CALIFORNIA

ESCONDIDO, CALIF.—Engel Aircraft Specialties is building a hangar 80 x 140 feet, including shops and display rooms, at Escondido Airport and is planning considerable expansion in the next six months.

GLENDALE, CALIF.—Airparts Inc., has let contract to Kersey Kinsey, 12345 Ventura Blvd., Studio City, Calif., for an addition at 727 Sonora Ave., Glendale, 44 x 80 feet, to cost about $10,000.

LONG BEACH, CALIF.—Harbor Steel Construction Co. Inc. has been formed with $75,000 capital by W. C. Allen and associates. D. A. Boone, 300 Jergins Trust Bldg., Long Beach, is representative.

LONG BEACH, CALIF.—Alaska Pipe & Salvage Co. has permit for building a warehouse at 1825 Cowles street, to cost $5000, and another for an addition to the company's warehouse at 3427 East Anaheim St., San Pedro, Calif., 80 x 100 feet, to cost $16,000.

LOS ANGELES—Aerobody Co. is erecting a plant building at 4801 East Washington Blvd., East Los Angeles, 45 x 100 and 44 x 45 feet, to cost about $10,000.

LOS ANGELES—Soule Steel Co. is building a warehouse at 6300 Wilmington Ave., Florence District, 70 x 325 feet, to cost about $73,000.

LOS ANGELES—Capital Welding & Mfg. Co. has building permit for plant building at 1201 West Rosecrans Ave., Clearwater District, 60 x 80 feet, to cost about $12,000.

LOS ANGELES—Field's Auto Body Works, 510 West Pershing Rd., Chicago, is erecting a manufacturing building at 1608 Essex St., 60 x 137 feet, to cost about $25,000.

SAN DIEGO, CALIF.—National Iron Works, foot of Seventh St., has let contract to Trepte Construction Co., 2001 Kettner Blvd., San Diego, for an office building at 2745 East Belt St., 60 x 100 feet, costing about $35,000.

VERNON, CALIF.—Norris Stamping & Mfg. Co., 5215 South Boyle Ave., has building permit for large water tank costing about $23,000.

VERNON, CALIF.—Bethlehem Steel Co. is erecting a storage building at 3391 East Randolph St., 31 x 110 feet, costing $10,000.

OREGON

DALLAS, OREG.—City is having plans prepared for a sewage disposal plant to cost about $100,000.

HERMISTON, OREG.—City plans replacement of two pumping units and $50,000 expansion of sewage treatment plant.

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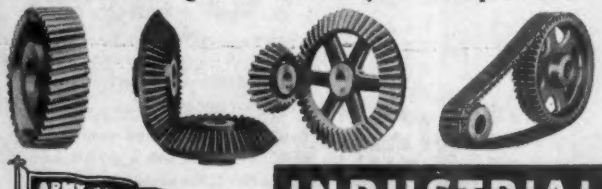

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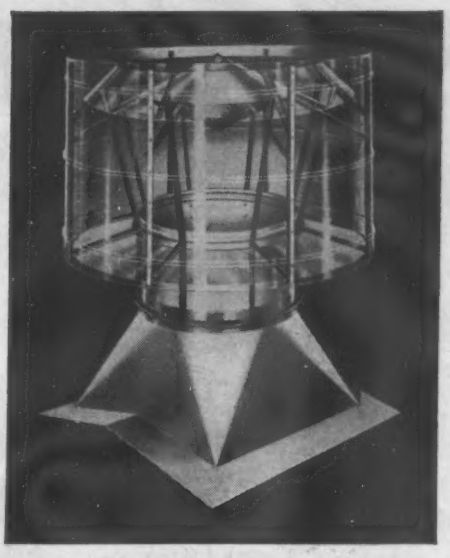

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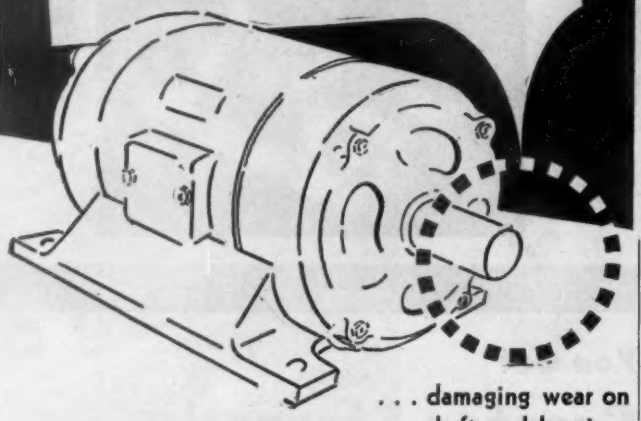

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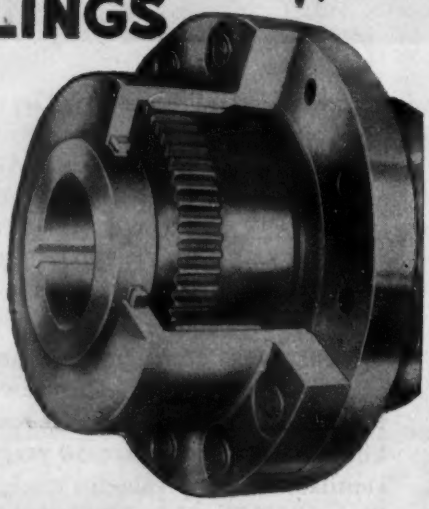

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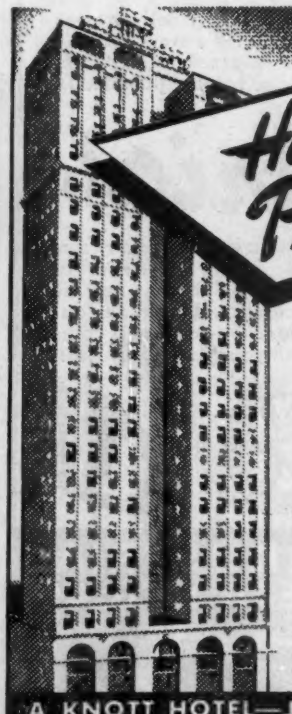

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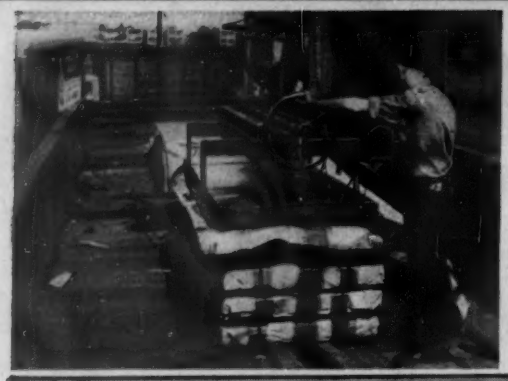

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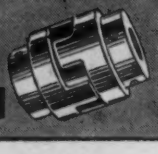

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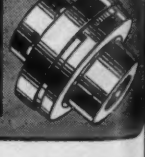

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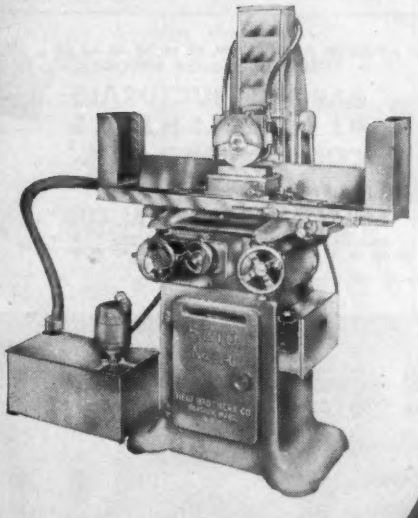

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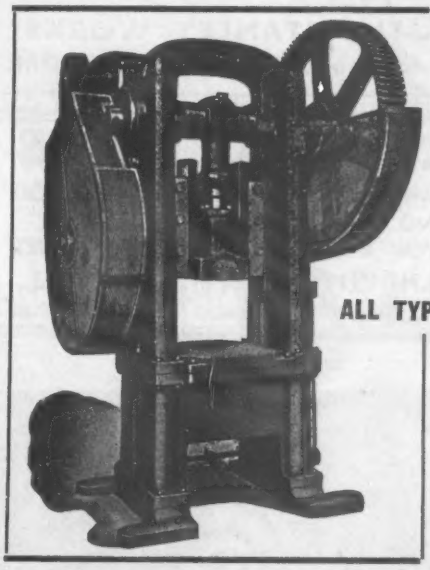

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48″ NILES-BEMENT-POND Car wheel Boring Mill with hoist. AC or DC motor.

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120″ BETTS Heavy Vertical with two swiveling heads, Power Rapid Traverse, AC or DC motor drive.

120″ NILES-BEMENT-POND Vertical with two swiveling heads, Power Rapid Traverse. AC or DC motor drive.

120″ CINCINNATI Massive Pattern Vertical with two swiveling heads, Power Rapid Traverse. AC or DC motor drive.

10′-16′ CINCINNATI extension Type Vertical with two swiveling heads, Power Rapid Traverse. AC or DC motor drive.

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5½″ BAR NILES - BEMENT - POND Heavy floor Type Horizontal Boring, Drilling, Milling Machine. AC or DC motor drive.

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4′ HAMMOND High Speed sensitive drill, lever feed with tapping attachment, AC or DC motor drive.

5½′ AMERICAN Full Universal Triple Geared with tapping attachment. Single pulley belt drive or AC or DC motor drive.

6′ CARLTON Plain 15″ round column with DC motor on arm, tapping attachment.

8′ NILES-BEMENT-POND "Right Line". Plain with 230 volt DC motor on arm, tapping attachment.

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12″ O.S. WALKER single stroke surface grinder with 12″ dia. magnetic chuck and 7½ H.P. AC or DC motor.

NO. 16 BLANCHARD High Power Vertical surface grinder with 26″ magnetic chuck and 20 H.P. AC or DC motor.

NO. 1 BESLEY disc grinder with two 12″ dia. steel discs and two plain tables, belt drive through countershaft.

LATHES

27″x12′ AMERICAN 8 speed geared head, 96″ between centers. AC or DC motor drive.

42″x36′ PUTNAM Geared Head, 25′ between centers. Quick change gear box. AC or DC motor drive.

48″x30′ BRIDGEFORD 9 speed geared head, 20′ between centers. Triple geared internal face plate drive. AC or DC.

48″x20′ NILES-BEMENT-POND Extra Heavy Geared Head, 11′5″ between centers. Power cross and angular feed to compound rest. Semi-quick change gear, taper attachment.

48″x59′ BRIDGEFORD Boring and turning with 9 speed geared headstock, turning carriage with compound rest, AC or DC motor drive.

NO. 4 PUTNAM Extra Heavy Center Drive Axle Turning Lathe with two carriages. AC or DC motor drive.

27″ SWING 98″ CENTERS BRIDGEFORD Plain Turning Lathe for car axles or heavy forgings, two carriages and tool rests. Single pulley belt drive or AC or DC motor drive.

42″ PUTNAM Heavy Double End Car wheel lathe. Equipped with overhead hoist for loading wheels and axles.

72″x77′ (65′ - 6″ centers) NILES-BEMENT-POND heavy geared head lathe. Two carriages with compound rests, power cross and angular feed. Power rapid traverse, taper attachment.

MILLERS

NO. 2 CLEVELAND plain, table 13″ x 50″ B&S Taper No. 11. Single pulley belt drive or AC or DC motor.

NO. 3B BROWN & SHARPE Plain with double overarm table 14″x60″ with 7½ HP, AC or DC motor.

NO. 3 KEARNEY & TRECKER Plain, dial type feeds. Power rapid traverse, table 16″x60″, AC or DC motor in base of column.

NO. 4 CINCINNATI High Power Plain. Power rapid traverse table 16½″x64″. Single pulley belt drive or AC or DC motor drive, vertical attach.

NO. 5B BROWN & SHARPE Plain, Power rapid traverse, table 22″x81″. AC or DC.

NO. 1½ KNIGHT vertical milling and drilling with power longitudinal feed to tilting table. Table 7½″x29″, AC or DC motor drive.

NO. 4 CINCINNATI High Power Vertical, Power rapid traverse. Table 16½″x64″. Single pulley belt drive or AC or DC motor drive.

24″x24″x12′ INGERSOLL Horizontal Spindle Slab Miller with adjustable rail, table 24″x12′. AC or DC motor drive.

30″ x 30″ x 10′ NEWTON Horizontal Spindle Slab Miller with adjustable rail, table 27″x11′. AC or DC motor drive.

24″x36″x12′ INGERSOLL Planer Type side milling machine with two power feed heads on housings for side milling only.

24″x24″x12′ INGERSOLL Planer Type milling machine with one head on adjustable rail and two side heads, AC or DC motor drive.

42″x26″x12′ INGERSOLL Planer Type Milling machine with two heads on adjustable rail & two side heads. AC, DC.

PLANERS

36″x36″x14′ PUTNAM Heavy Planer with two heads on rail. 230 Volt DC reversing type planer motor and control.

38″x38″x14′ OHIO Heavy with two heads on rail and one side head. 230V DC reversing type planer motor and control.

48″x48″x16′ NILES - BEMENT - POND Heavy with two heads on rail and two side heads. 230V DC reversing type planer motor and control.

48″x48″x18′ G.A. GRAY Spiral Drive with two heads on rail and one side head. AC motor drive with self-contained countershaft.

48″x48″x24′ NILES - BEMENT - POND Heavy with two heads on rail and two side heads. 230 Volt DC reversing type planer motor and control.

48″x48″x32′ G. A. GRAY Spiral Drive with two heads on rail and two side heads. 230 Volt DC reversing type planer motor and control.

48″x48″x24′ NILES - BEMENT - POND Heavy with two heads on rail and one side head. AC motor drive through self-contained countershaft.

48″x48″x20′ F. R. PATCH Heavy with two heads on rail and two side heads. 230V DC reversing type motor and control.

60″x48″x18′ G. A. GRAY widened Spiral Drive with two heads on rail and one side head. AC motor drive.

72″x72″x18′ NILES - BEMENT - POND Heavy, two heads on rail and two side heads. 230 Volt DC reversing type planer motor and control.

72″x72″x20′ NILES - BEMENT - POND Extra Heavy, two heads on rail and two side heads, 230 Volt DC reversing type planer motor and control.

84″ Widened to 98″x32″x42′ SOUTHWARK Extra Heavy, two rail heads and two side heads. 230 Volt DC reversing type planer motor and control.

16′x10′x30′ BETTS heavy, two heads on rail and two sideheads, forced feed lubrication. 230 Volt DC reversing type planer motor and control.

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6″ PRATT and WHITNEY vertical shaper.

NO. 3 CRESCENT double arbor saw table, table top 36″x48″, diameter of saws used 16″, AC or DC motor drive.

30′ NO. 3 HILLES JONES plate edge planer.

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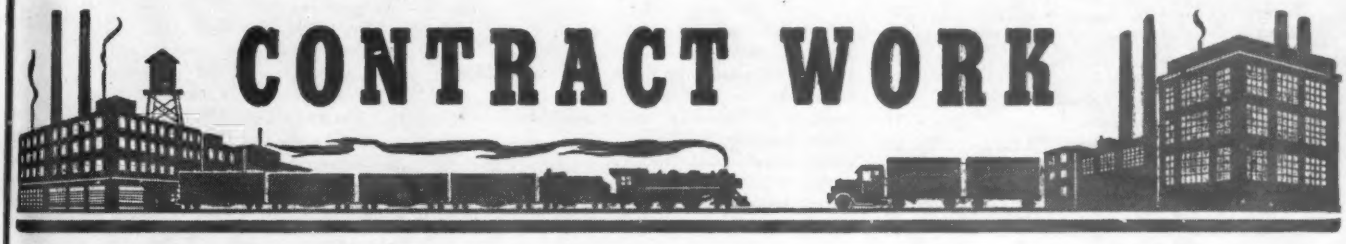

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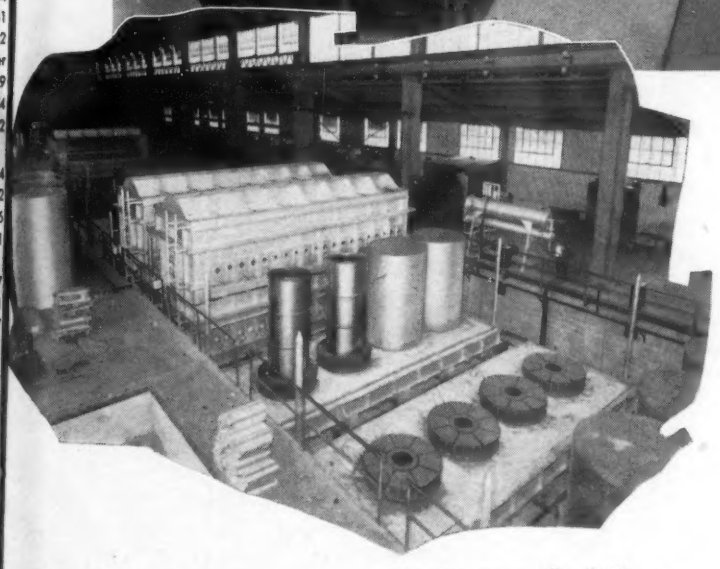
WILSON Rectangular Bell Type Furnaces for Steel Coil Annealing

One installation of 42 Furnaces and 126 Bases used exclusively for annealing tin plate coils.



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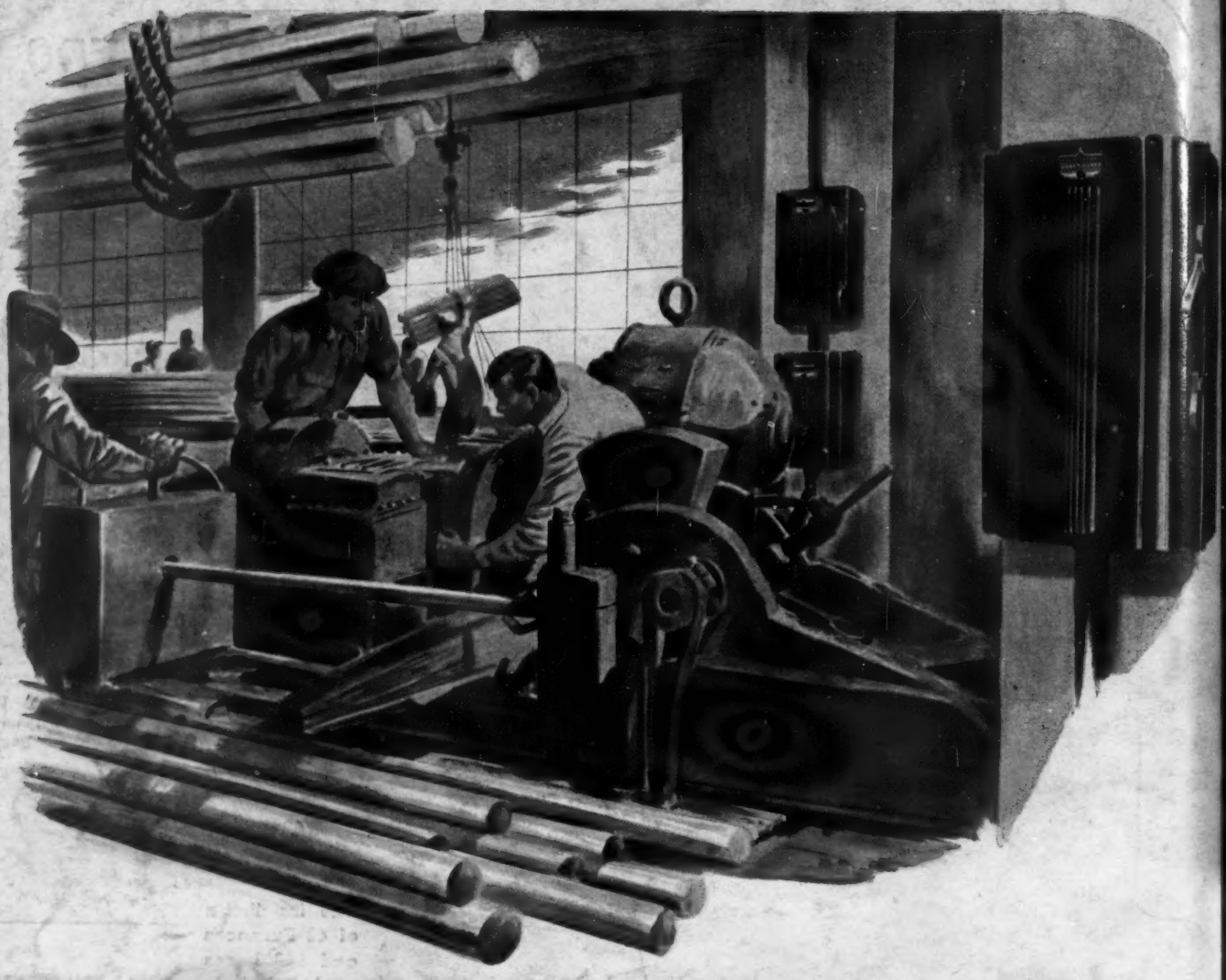

NEW SAFETY FOR SAFETY SWITCHES

New Cutler-Hammer design ends mystery of time-welded contacts

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Cutler-Hammer engineers found the answer to this problem of welded switch contacts, strangely enough, within the "nothing to do" life which all safety switches lead. They found that safety switches were far from idle during the months and months of seeming inactivity while they were simply standing guard for a possible emergency. During all this time, hour after hour, the switch parts were carrying *all* the power to the machines they were protecting. This flow of power generated much unavoidable heat, which literally *baked* the life out of the switch mechanism. This baking caused the switch contacts to gradually relax their grip on the blades which they held so tightly when new. This lessening contact pressure produced sparking . . . then arcing . . . then *welding* of the contacts. Here, then, was the secret of most safety switch troubles. Internal heating, *time-welded* contacts! Today an entirely new line of Cutler-Hammer Safety Switches is ready to bring your men and equipment protection worthy of your insistence. Specify Cutler-Hammer and refuse any substitute. Carried in stock by recognized electrical wholesalers everywhere. CUTLER-HAMMER, Inc., 1310 St. Paul Avenue, Milwaukee 1, Wisconsin.

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